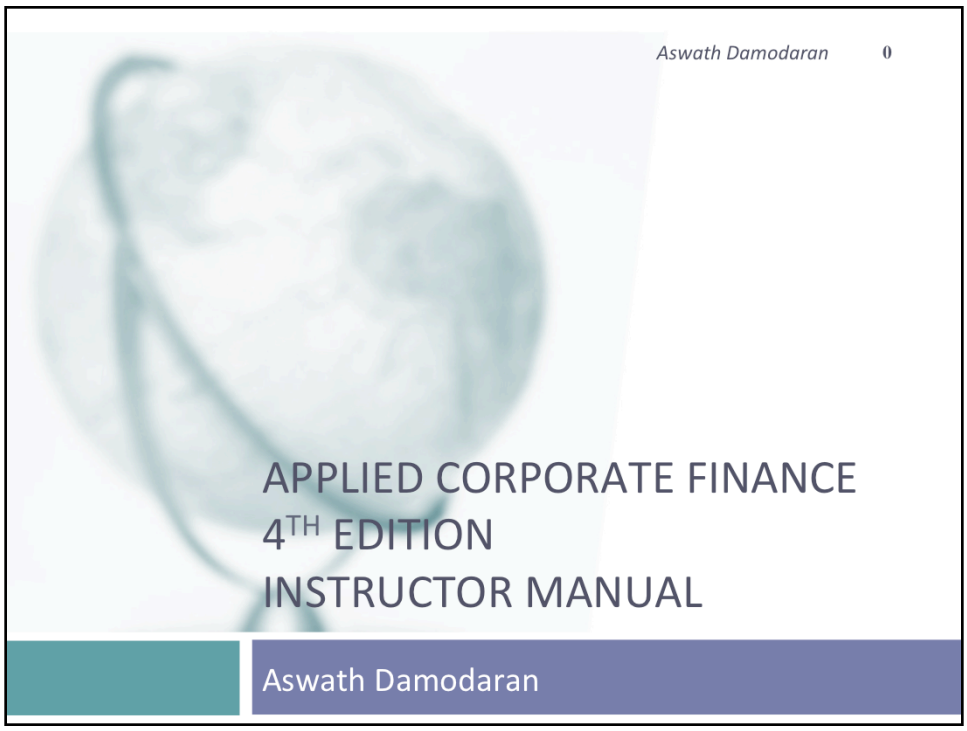


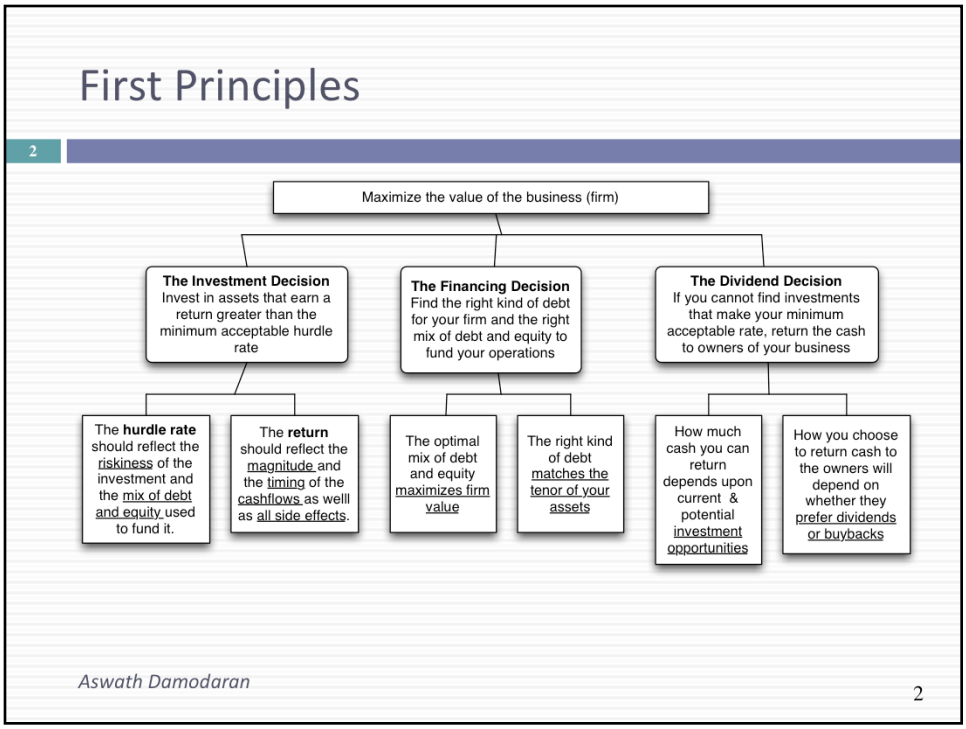
This is an unconventional instructor's manual. Rather than provide notes on each chapter, I have attached the notes to the slides that I use in my class. Feel free to modify, adapt, delete or add to this presentation. By the way, while this packet will stay static (Spring 2014 notes), I will update the slides each year. You can get the latest version of the slides (and the notes) by downloading the following two files:

http://www.stern.nyu.edu/~adamodar/pptfiles/acf4E/cfpacket1.ppt

http://www.stern.nyu.edu/~adamodar/pptfiles/acf4E/cfpacket2.ppt

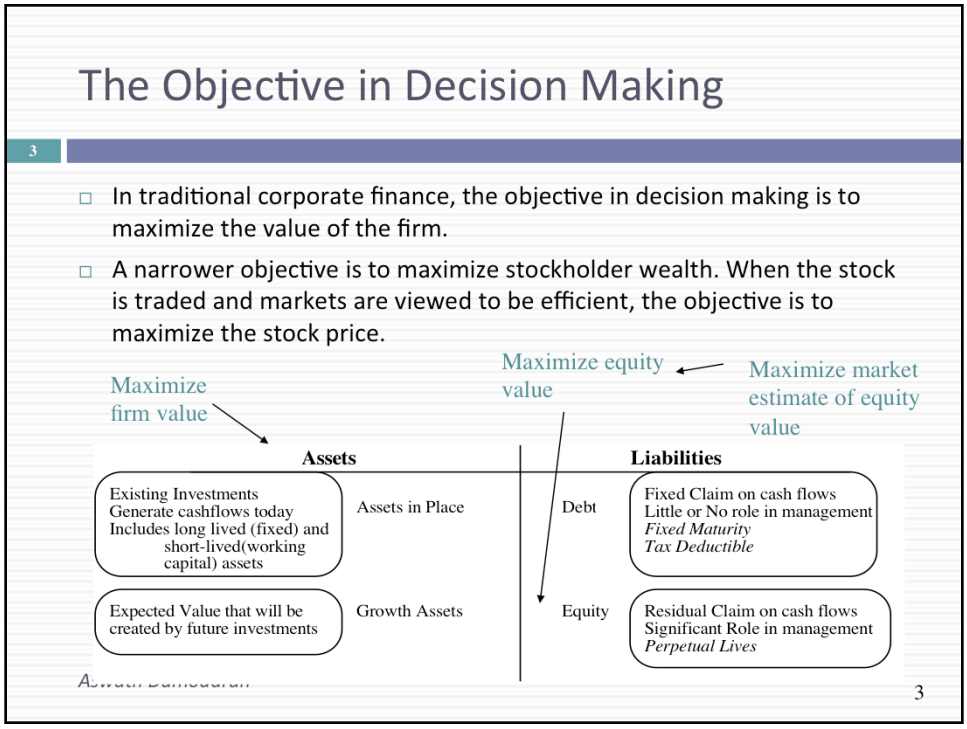
And have fun teaching this class. I always do!

Since the objective in corporate finance (to maximize firm value) is central to everything we do, we need to look at both its strengths and weaknesses. In fact, many disagreements that people have with corporate finance theory stems from the fact that they have a different objective for the business in mind. Thus, if you view a firm's objective as maximizing the number of jobs created, choosing projects based upon the highest NPV (which is the corporate finance prescription) will make little sense.



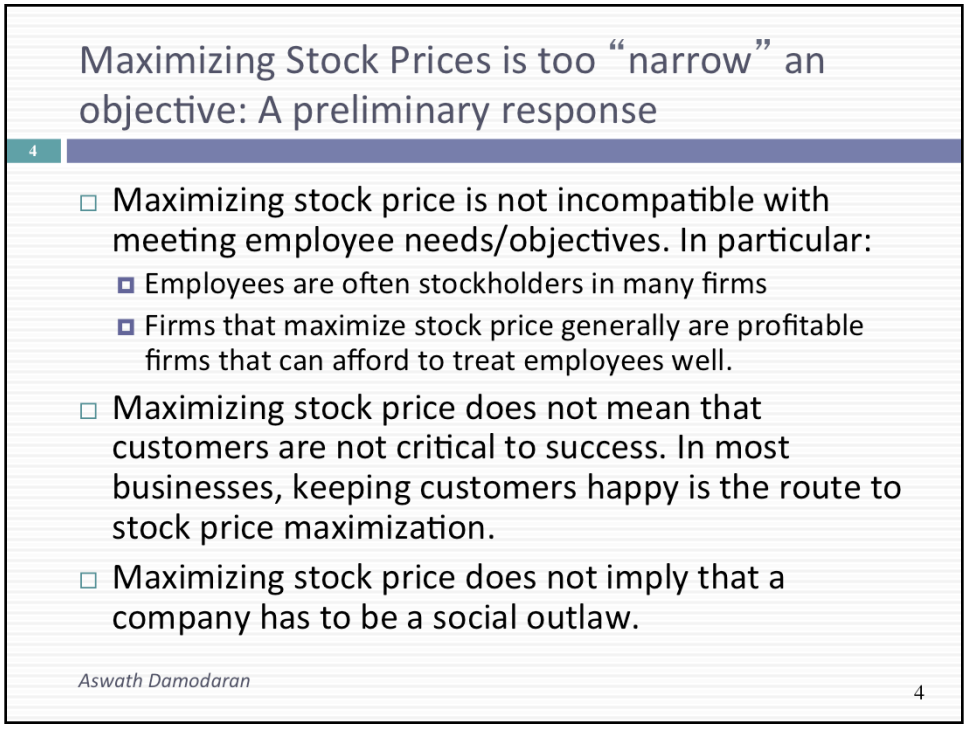
Our focus will be on the objective: Maximize firm value.

Since so much of corporate finance is built on this objective, it is important that we be clear about what it means and why we choose it. In addition, it is also worth exploring what the alternatives are and why this objective is preferable to the alternatives.



This is the answer to the question posed in the previous overhead.

1. Maximizing the value of the business is the most general objective function. Remember that value of the business includes assets in place and growth assets. If you are managing a growth company,, increasing earnings may not necessarily increase firm value. The other problem is that firm value itself is a difficult number to estimate. While there are models available, they all need inputs, most of which allow for subjective judgments.
2. Managers answer to stockholders. Consequently, the objective gets narrowed down to "maximizing equity value". (Implicit assumption: Bondholders/ Banks can protect themselves by writing in covenants and setting interest rates).
3. It is tough to assess equity value objectively. It would be nice to have a "third party" estimate that is objective. For publicly traded firms, the market (in spite of all its limitations) provides such an estimate. (Implicit assumption: Markets are rational and reasonably efficient).



Critique: Stock price maximization implies not caring for your employees.

Response: Use a recent story of layoffs to illustrate this criticism (XYZ Co. announced it was laying of 15,000 employees and stock price jumped $3.50). Then note that this is the exception rather than the rule. A Conference Board study from 1994 found that companies whose stock prices have gone up are more likely to hire people than one whose stock prices have gone down. Also note that employees, especially in high tech companies, have a large stake in how well their company does because they have stock options or stock in the company.

Critique: If you maximize value, you don't care about customers.

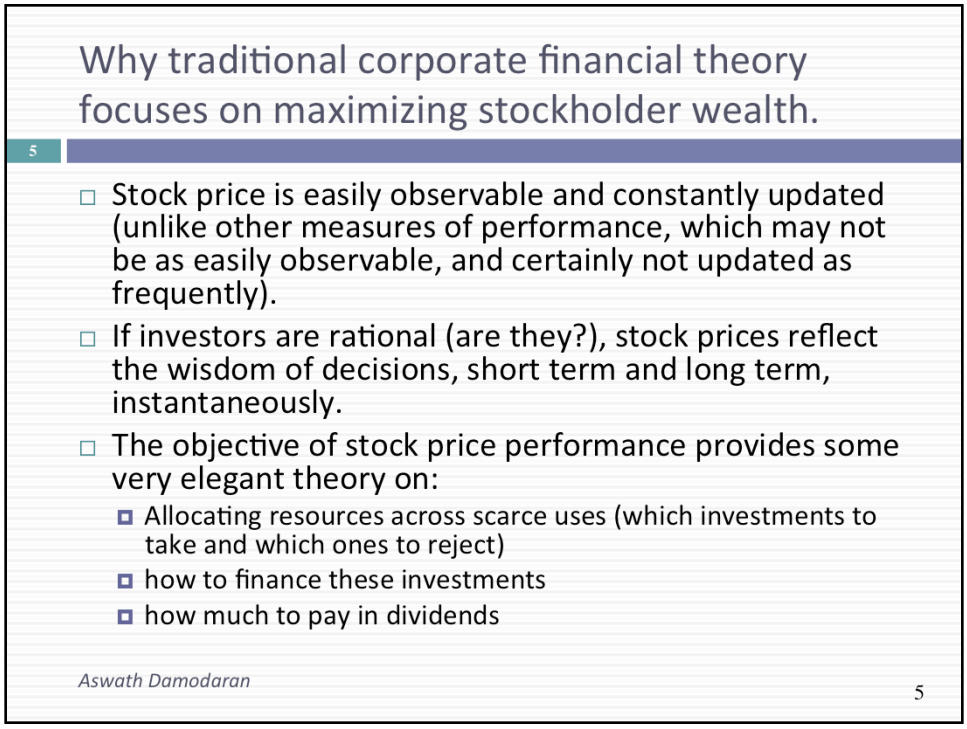
Response: Note that customer satisfaction is important but only in the context that satisfied customers buy more from you. What would happen to a firm that defined its objective as maximizing customer satisfaction? You would give away your products for free…

Critique: Firms that maximize firm value are bad social citizens.

Response: A healthy company whose stock price has done well is much more likely to do social good than a company which is financially healthy. Again, note that there are social outlaws who might create social costs in the pursuit of stock price maximization (Those nasty corporate raiders..) but they are the exception rather than the rule.

To those who would like to have it all (they take different forms, but they talk about stakeholder wealth maximization or balanced scorecards or running a great company): It never works:

a. You cannot be all things to all people; keeping everyone happy leaves no one happy. You need a central objective. Otherwise, how do you choose between competing objectives?
b. You cannot mix up means with ends. You want satisfied and motivated employees and



It is important it is to have an objective function that is observable and measurable. Fuzzy or multiple objectives are disastrous for several reasons:

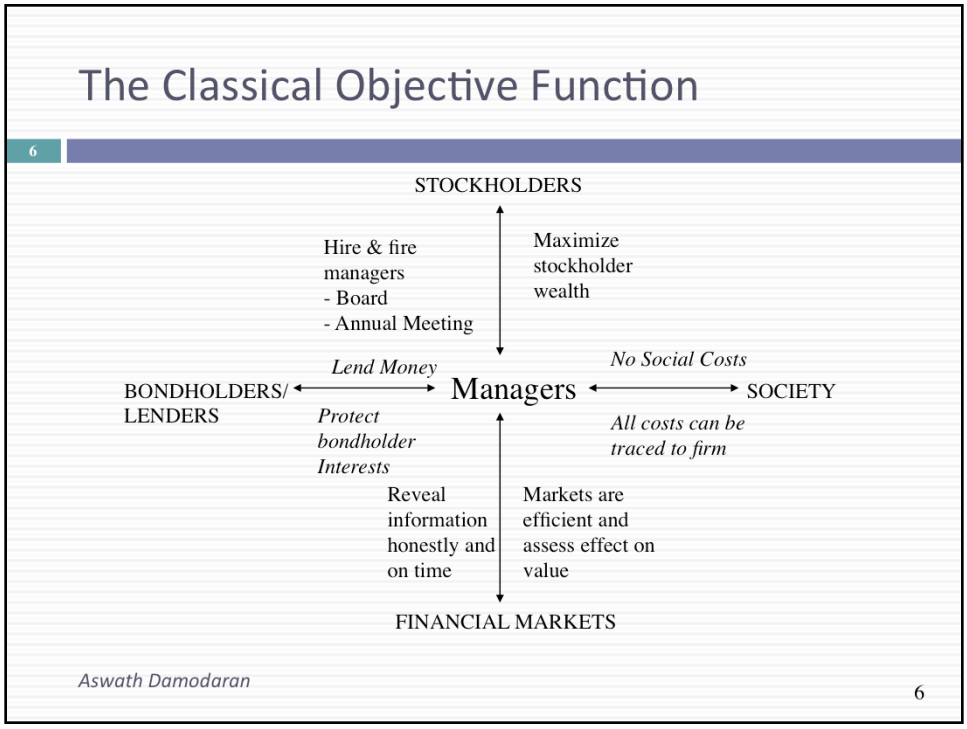
a. Different decision makers define it to mean different things and can work at cross purposes with each other.

b. If your objective is fuzzy, it becomes very difficult to measure performance and how close you are to accomplishing your objective.

Note that stock prices provide almost instantaneous feedback (some of which is unwelcome) on every decision you make as a firm. Markets may not be perfect (they are far from it) but they are quick and unbiased.

Consider the example of an acquisition announcement and the market reaction to it. Stock prices of the acquiring firm tend to drop in a significant proportion of acquisitions. Why might markets be more pessimistic than managers about the expected success of an acquisition? Because the track record of firms on acquisitions is not very good.

There is also a legal basis for this focus. Courts (especially in Delaware, where most US corporations are incorporated) have long held that managers and board members have a primary fiduciary responsibility to the owners (stockholders). All other players in the game are secondary…

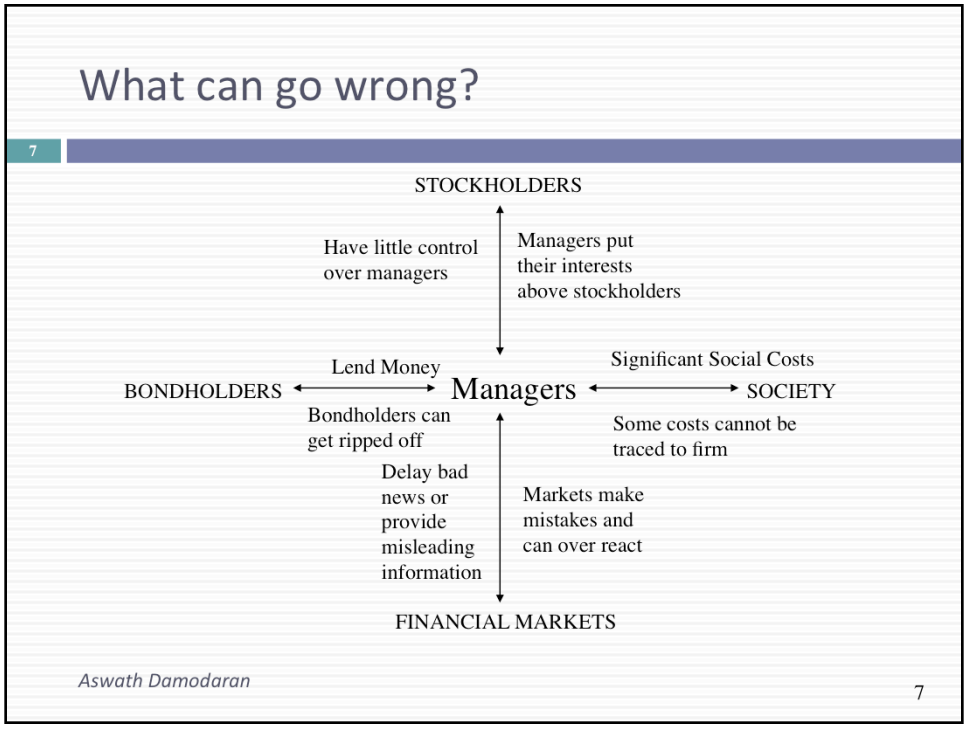


This is the utopian world. None of the assumptions are really defensible as written, and skepticism is clearly justified:

Why do we need these assumptions?

1. Since, in many large firms, there is a separation of ownership from management, managers have to be fearful of losing their jobs and go out and maximize stockholder wealth. If they do not have this fear, they will focus on their own interests.
2. If bondholders are not protected, stockholders can steal from them and make themselves better off, even as they make the firm less valuable.
3. If markets are not efficient, maximizing stock prices may not have anything to do with maximizing stockholder wealth or firm value.
4. If substantial social costs are created, maximizing stock prices may create large side costs for society (of which stockholders are members).

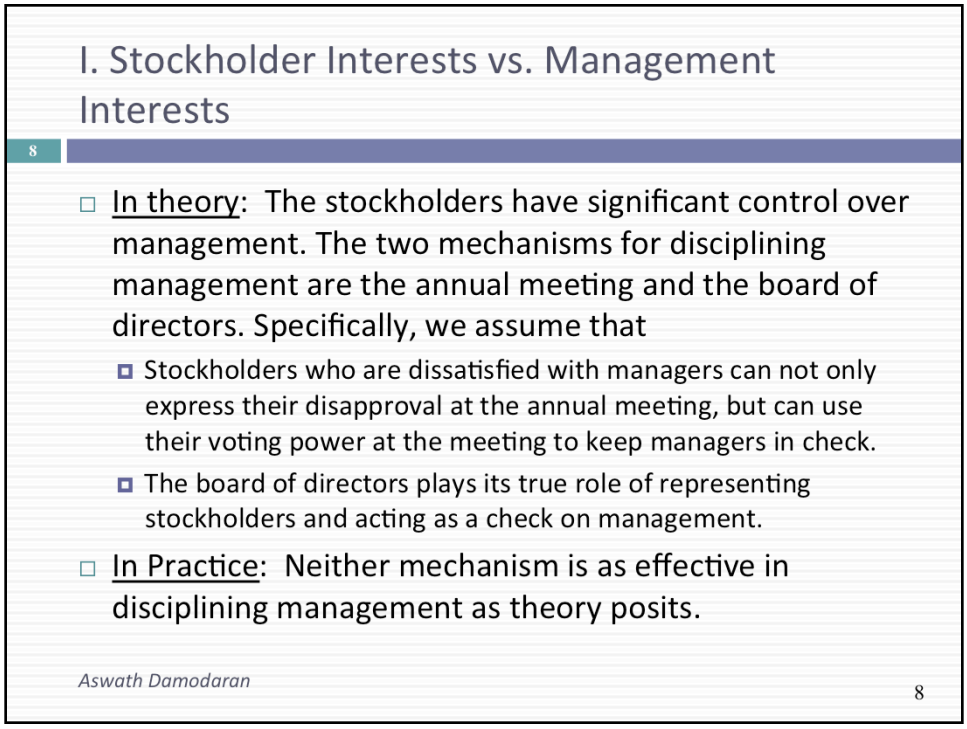
Note that corporate finance, done right, is not about expropriating or transferring wealth from other groups (bondholders, other stockholders or society) but about making the firm more productive and valuable. In this utopian world, the only way to increase value is to go out and take good investments. In the process, you contribute positively to the overall economy.



This is my worst case scenario:

1. Stockholders have little or no control over managers. Managers, consequently, put their interests above stockholder interests.
2. Bondholders who do not protect themselves find stockholders expropriating their wealth.
3. Information conveyed to markets is noisy, biases and sometimes misleading. Markets do not do a very good job of assimilating this information and market price changes have little to do with true value.
4. Firms in the process of maximizing stockholder wealth create large social costs.

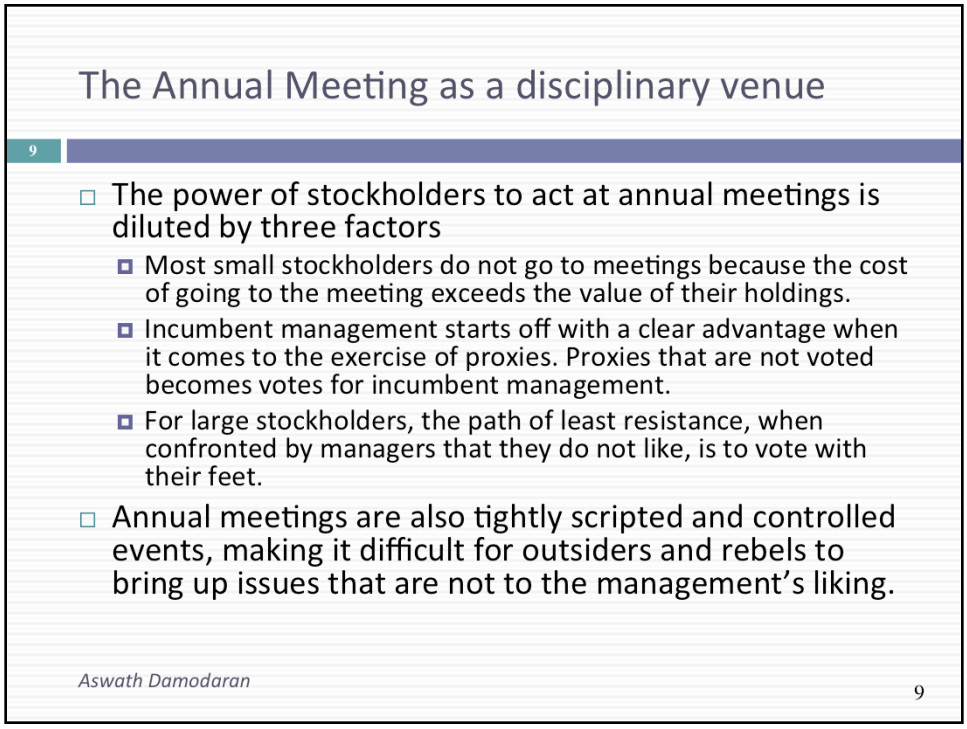
In this environment, stockholder wealth maximization is not a good objective function.



In theory, stockholders are supposed to come to the annual meeting, and make informed judgments about whether they want to keep incumbent management in place. Large stockholders act like private business owners and are vigilant about protecting their interests.

The board of directors is supposed to protect the stockholders and keep an eye on top managers.

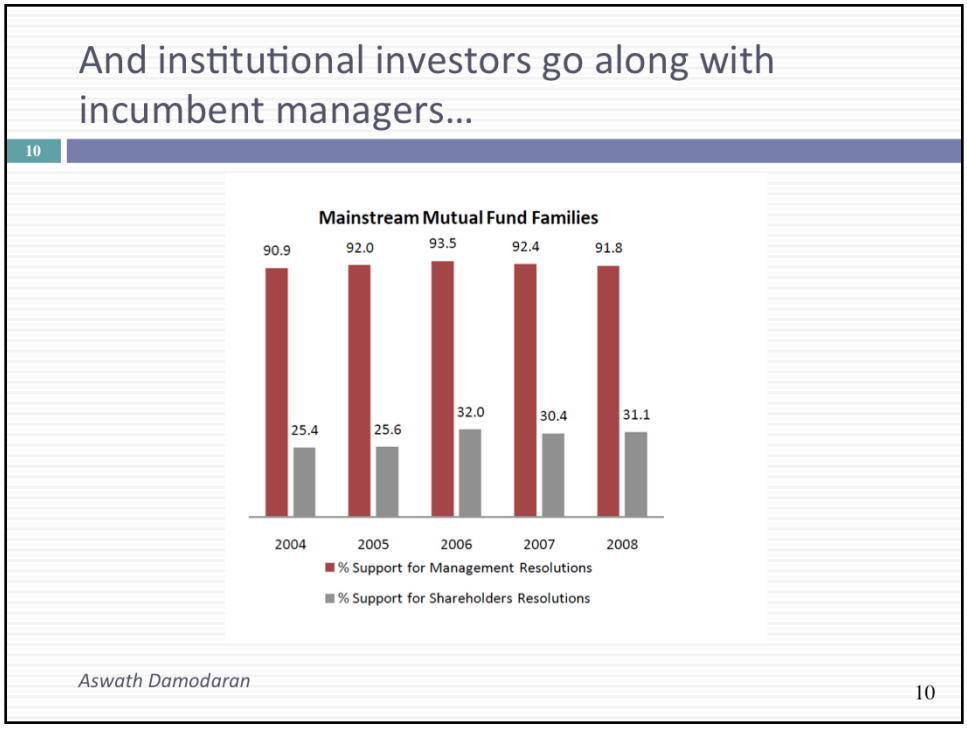
So why don't these mechanisms work?



It is not irrational for small stockholders to not actively involve themselves in the management of firms, because it is not economical for them to do so.

1. A significant percentage of proxies do not get turned in. In many firms, the managers of the firm get the votes commanded by these proxies. That would be the equivalent of having an election and allowing the incumbent to get the votes of anyone who does not vote.
2. For large institutional stockholders like Fidelity and Black Rock, with its hundreds of holdings, it just might not be feasible to be an active investor. There are also potential conflicts of interest, since Fidelity is also in the business of managing corporate pension funds… Even activist investment funds (such as the California Pension Fund), have pulled back in recent years. (Putnam exception? See WSJ article on Putnam: Putnam is one of the few mutual fund companies to contest management)

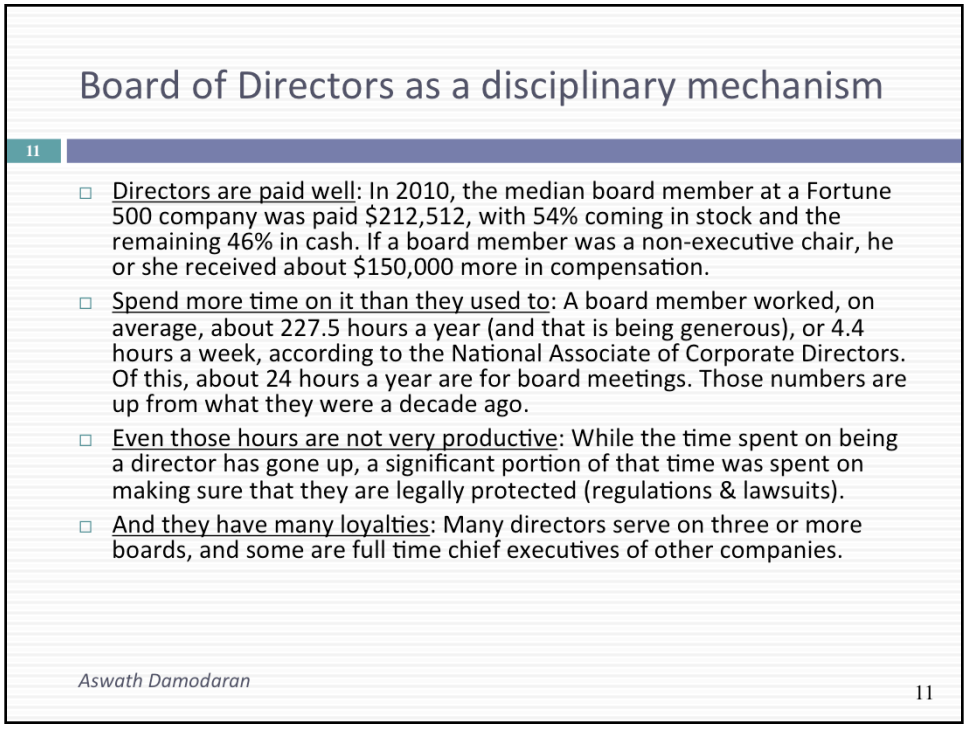
The annual meeting is tightly scripted and run, making it difficult for dissident stockholders to be heard. (In Japan, in the 1980s, trouble makers were hired to heckle stockholders who tried to ask managers tough questions. In Europe, until very recently, annual meetings were exquisitely well mannered affairs where elite managers told plebian stockholders what was good for them - shades of Marie Antoinette and "let them eat cake"…. (At Tattingers, the French luxury good company, Claudia Tattinger said that she felt ashamed for the stockholders who would ask "such rude questions" after Asher Edelman



You would expect mutual funds and other institutional investors to take a more activist role and act as a check on the incumbent managers at annual meetings. For the most part, though, they seem to be supporters of the status quo, seldom challenging managers (even when they are wrong). This can be attributed to two factors:

1. Cost: It is costly to challenge incumbent managers. For institutional investors spread over multiple firms, this cost may be too high to bear.

2. Conflicts of interest: Many mutual fund families also look to companies for business. To the extent that challenging managers may cost them this business, they may hold back.

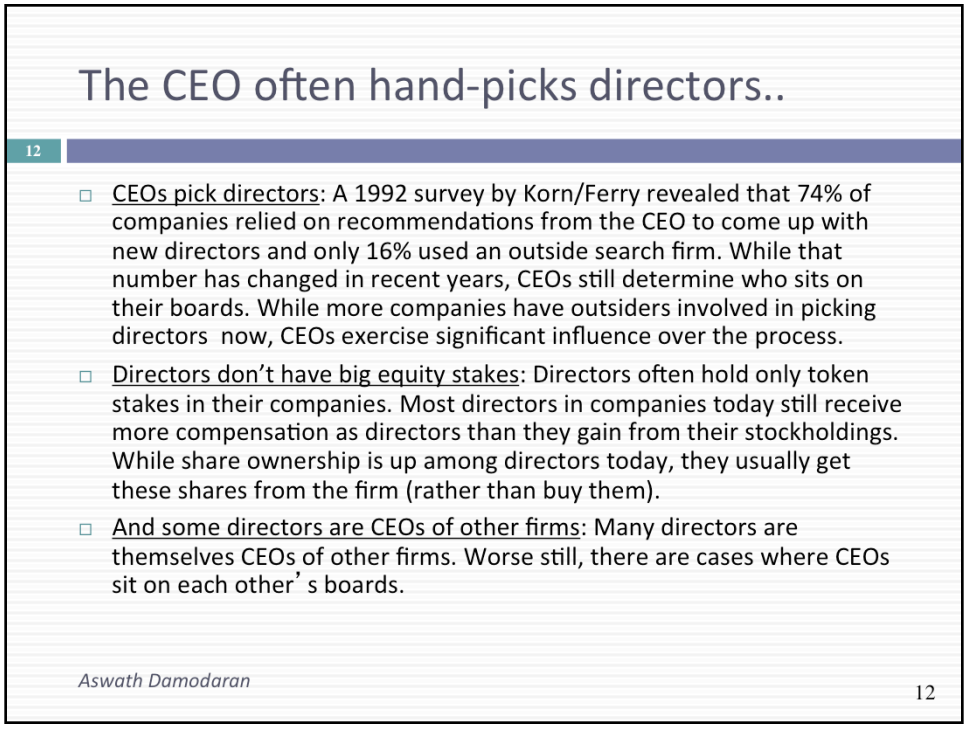


This sounds judgmental and it is meant to be. Directors do not spend a great deal of time overseeing managers, and they are well paid.

The pay shown here understates the true compensation that directors make from other perks and benefits that they get (pensions, for instance).

As a postscript, the pay of directors has kept rising. While the number of hours spent has also increased somewhat though how much of this additional time is spent on getting legal protection (against stockholder lawsuits) is debatable.

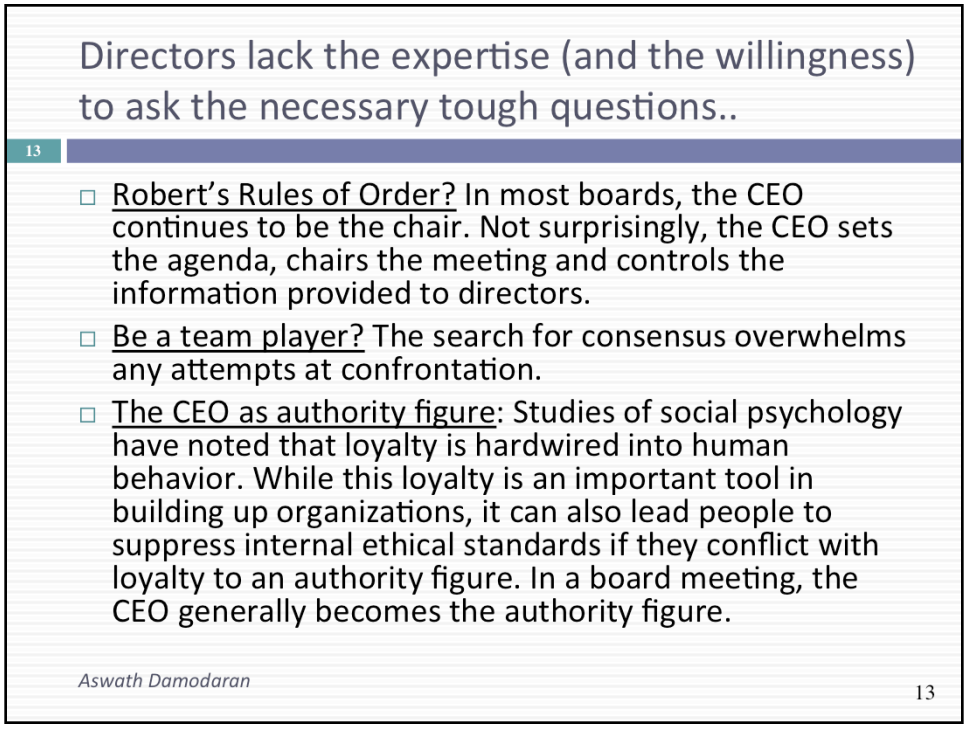
Post Sarbanes-Oxley, directors seem to spend more time with lawyers, making sure that they don't get sued than they do with managers, trying to figure out whether the company is well run. This may be the unintended consequence when you try to get good corporate governance by passing laws.



When John Mack became CEO of Morgan Stanley, the fist two directors he picked to sit on the board were members of his golf club in Purchase, NY… Most CEOs get a say in who gets to sit on their boards. Even when there are nominating committees on boards, they seldom operate independently.

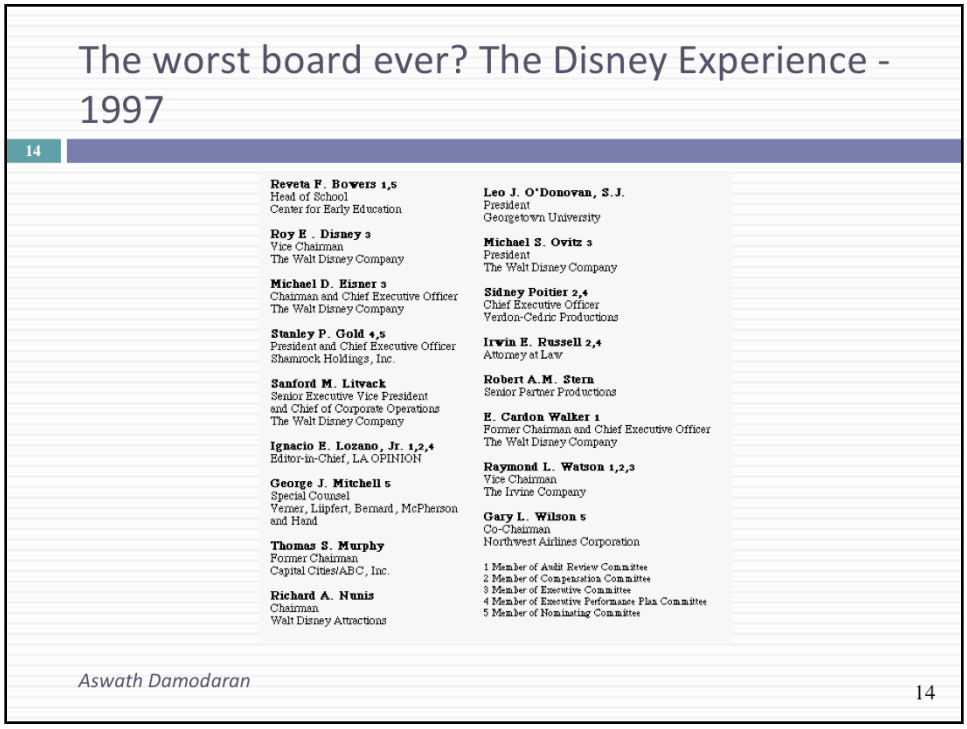
This adds to why directors spend so little time on oversight. CEOs, left to themselves, will seldom pick adversarial directors. Directors also make far more money from directorships than they do from owning stock in the firm. Not surprisingly, they do not take the side of stockholders.

A large percentage of directors on boards also happened to be CEOs of other companies. Given that they already have full time jobs as CEOs, it is difficult to believe that they have the time to perform their directorial duties.



Harold Geneen who ruled ITT with an iron fist during the sixties when ITT built itself up through acquisitions, mentions in his memoirs that almost all decisions, during his tenure, that were made by the board, were unanimous. CEOs often chair the board, and establish the agenda for what the board discusses.

Behavioral aside: Studies show that over time, even boards that are constructed to be independent tend to bend more and more towards viewing the CEO as an authority figure.

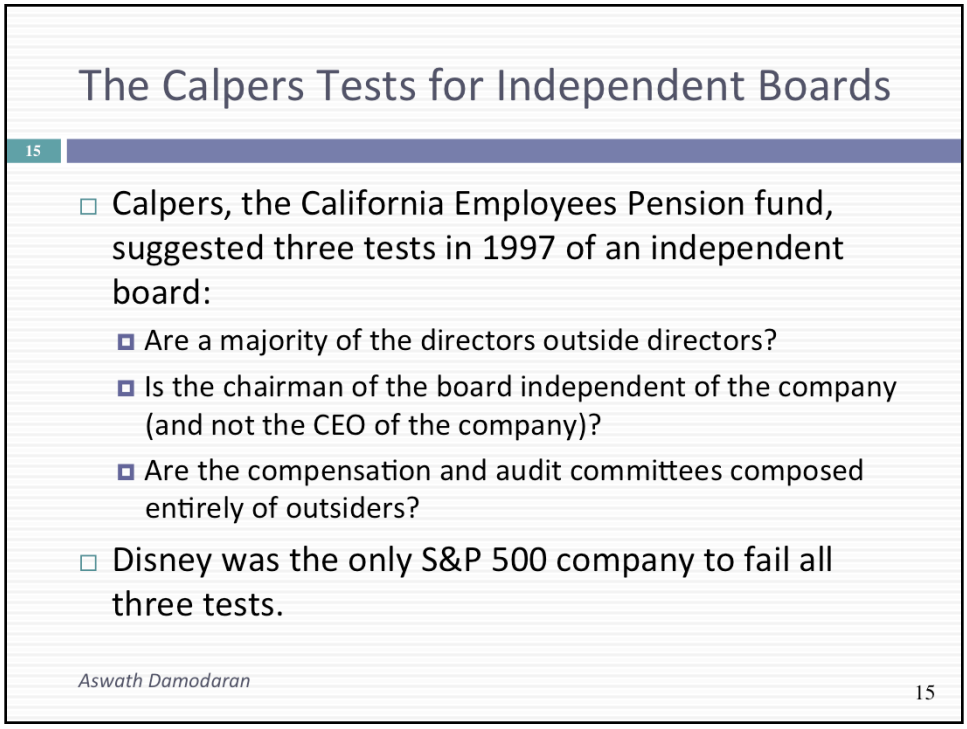


This may be going back in time but it may help understanding Disney's present standing. This was Disney's board at the height of Michael Eisner's powers. (Eisner became CEO of Disney in 1985 and consolidated power in the years after.)

Note the number of insiders on the board. (Seven out of 16; five current employees & two ex-employees) Also note the presence of Mr. Eisner's private attorney (Irwin Russell) and the principal of his childrens' elementary school (Reveta Bowers) on the board.

How independent was this board likely to be of Mr. Eisner? This may explain some of the actions taken by Disney (and specifically Eisner) during the 1990s… (Read Disney War by James Stewart for the gory details)

-When Eisner was hired in 1984, he insisted on bringing in his protégé Jeffrey Katzenberg, his young assistant, into the firm with him. He put Katzenberg in charge of Disney Animation, which was not doing well. Katzenberg was largely responsible for the rebirth of that division (which Eisner had considered shutting down) with The Little Mermaid, Beauty and the Beast and The Lion King all proving to be mega-winners. As a reward for this success, Eisner fired him. His lucrative contract entitled him to 2% of the revenues from the movies he made in posterity but he would have settled for $100 million. Eisner refused to pay; Disney paid $ 250 million in 1999.



Calpers was one of the first institutional investors to pay attention to corporate governance. Every year, Calpers lists the 10 companies that were the worst culprits when it came to putting managerial interests over stockholder interests.

In the last twenty years, investors have become more aware of how important corporate governance is and there are an increasing number of services that focus on measuring and reporting on corporate governance.

Business Week piles on… The Worst Boards in 1997..

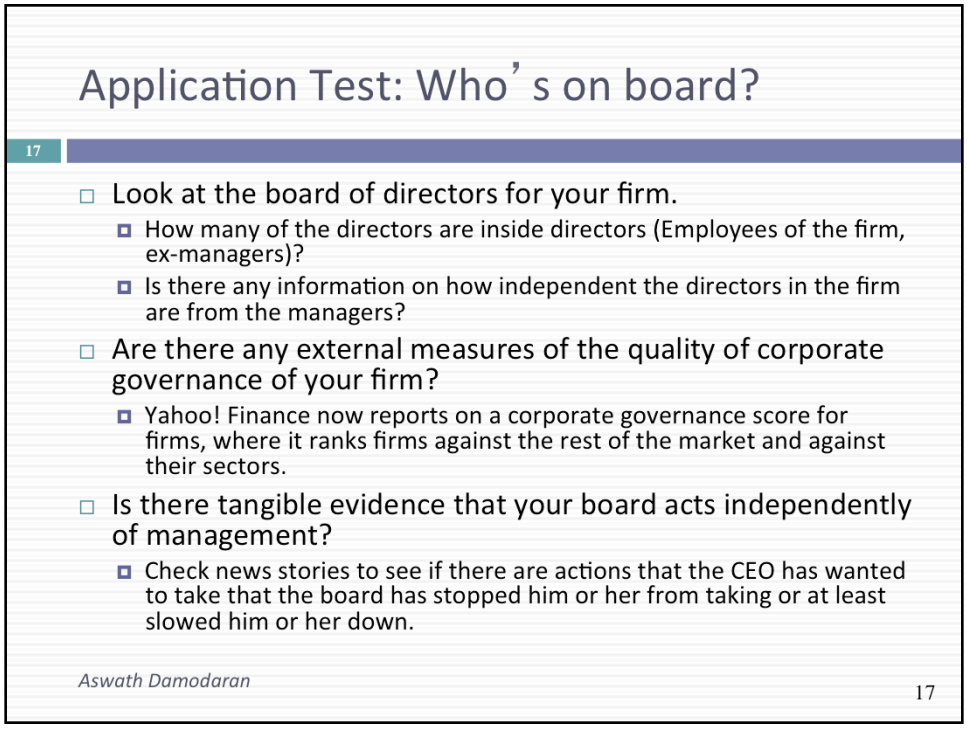
16

THE WORST BOARDS OF DIRECTORS

BW RANK	OVERALL SCORE	SURVEY SCORE	ANALYSIS SCORE	DETAILS	BOARD PERFORMANCE POLL: SHAREHOLDER ACCOUNTABILITY	BOARD PERFORMANCE POLL: BOARD QUALITY	BOARD PERFORMANCE POLL: BOARD INDEPENDENCE	BOARD PERFORMANCE POLL: CORPORATE PERFORMANCE	GOVERNANCE GUIDELINE ANALYSIS: SHAREHOLDER ACCOUNTABILITY	GOVERNANCE GUIDELINE ANALYSIS: BOARD QUALITY	GOVERNANCE GUIDELINE ANALYSIS: BOARD INDEPENDENCE
1. DISNEY	10.3	1.8	8.5	Investors decry board for conflicts; many directors own little if any stock	3.3	4.3	2.0	5.8	–0.4	2.8	2.2
2. AT&T	10.9	–16.6	27.5	Investors scorn board for failing to control succession, not ousting CEO	3.0	4.2	3.5	2.8	2.0	5.2	7.4
3. H.J. HEINZ	15.4	–1.1	16.5	Longtime CEO dominates insider-filled board; resists investor calls for change	2.8	3.7	2.0	4.7	4.4	6.0	1.4
4. ARCHER DANIELS MIDLAND	16.8	–12.2	29.0	Board changes fail to satisfy investors, who say directors still lack independence	2.3	2.1	1.3	3.5	5.6	7.6	5.0
5. DOW JONES	21.1	1.6	19.5	Investors disenchanted with performance; weakest attendance record of any board	2.6	4.6	2.8	2.6	6.0	0.0	5.8
6. DILLARD'S	22.0	5.0	17.0	Board loaded with insiders, lacks an outsider with retail expertise or CEO	2.0	3.0	2.0	3.5	6.4	3.2	2.0
7. ROLLINS INTERNATIONAL	22.7	1.7	21.0	Board dominated by family members and insiders; lacks nominating panel	1.0	1.0	0.0	2.0	4.0	7.6	4.4
8. OCCIDENTAL PETROLEUM	24.0	–1.5	25.5	Investors outraged over $95 million payout to CEO by cozy, aging board	1.3	2.0	1.1	2.0	2.8	6.0	5.8
9. OGDEN	27.2	4.2	23.0	Board has three consultants and a lawyer who do business with company	2.0	1.5	2.0	2.5	2.0	8.4	4.0
10. MAXXAM	28.3	4.3	24.5	Tiny board with little business experience dominated by CEO	1.5	2.0	1.0	3.5	3.6	2.0	6.0

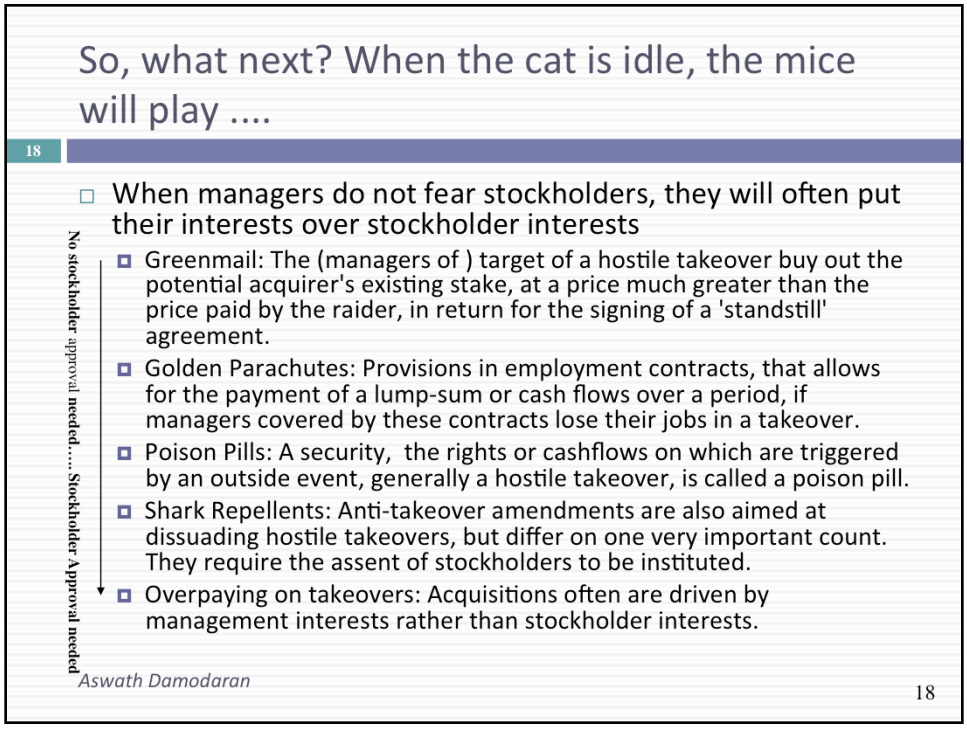
A poor board does not necessarily translate into a poorly managed firm. However, a poor board give CEOs carte blanche to do what they want to do… At some point in time, even good managers need restraint and good counsel. A rubber-stamp board will not provide that. (The best analogy is to a dictator… the line between a benevolent dictator and a malevolent one is a very fine one…)

As a stockholder, however, the fact that returns are good might not compensate for the fact that you do not believe that managers are responsive to your interests. (At the Disney stockholder meetings in both 1996 and 1997, there was substantial stockholder dissension in spite of the fact that the stock had performed reasonably in both periods.)



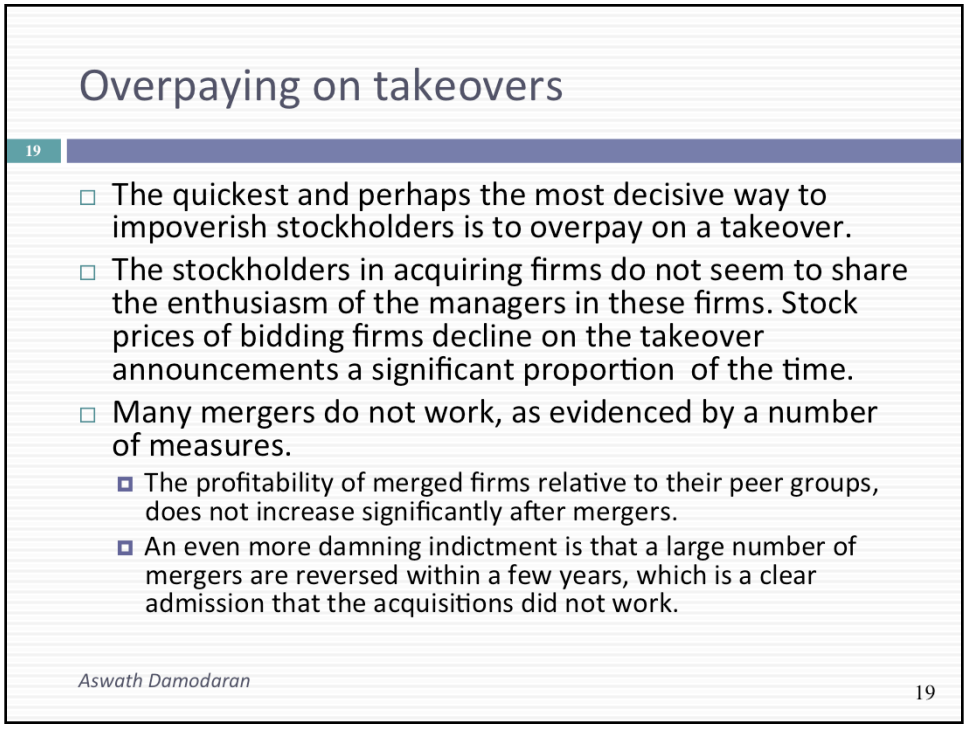
You can usually find this information for your firm in the 14-DEF filing that all firms in the US have to make with the SEC. If you have a non-US firm, this becomes more difficult to do. While you can usually find the names of the directors from the annual report, you may have a difficult time finding out the linkages (and potential conflicts) these directors may have with the managers of the firm.

You may also be able to find a corporate governance score for your company, especially if it is a large market cap company. Even if you cannot, you can make your own judgments on whether you (as a stockholder) are likely to have much influence on how this company is run.



These actions could all suggest that managerial interests are being put over stockholder interests. (Some of these actions, though, may also increase stockholder wealth. Managers will, of course, always claim that these actions are in stockholders' best interests)

The reason that I have put overpaying on poison pills and shark repellants below greenmail and golden parachutes is not because they create less damage to stockholders but because stockholders at least get a chance to voice their view (they both require stockholder approval). Greenmail and golden parachutes just require board approval.



Managers of acquiring firms almost always make every acquisition sound like a good idea. Stockholders are more skeptical (as is evidenced by the behavior of acquiring firm stock prices on the announcement of acquisitions).

Stockholders must be right, on average, since many takeovers do not seem to work in terms of increasing stockholder wealth or delivering higher profitability.

(Good references:

The Synergy Trap, Mark Sirower)

A case study in value destruction: Eastman Kodak & Sterling Drugs

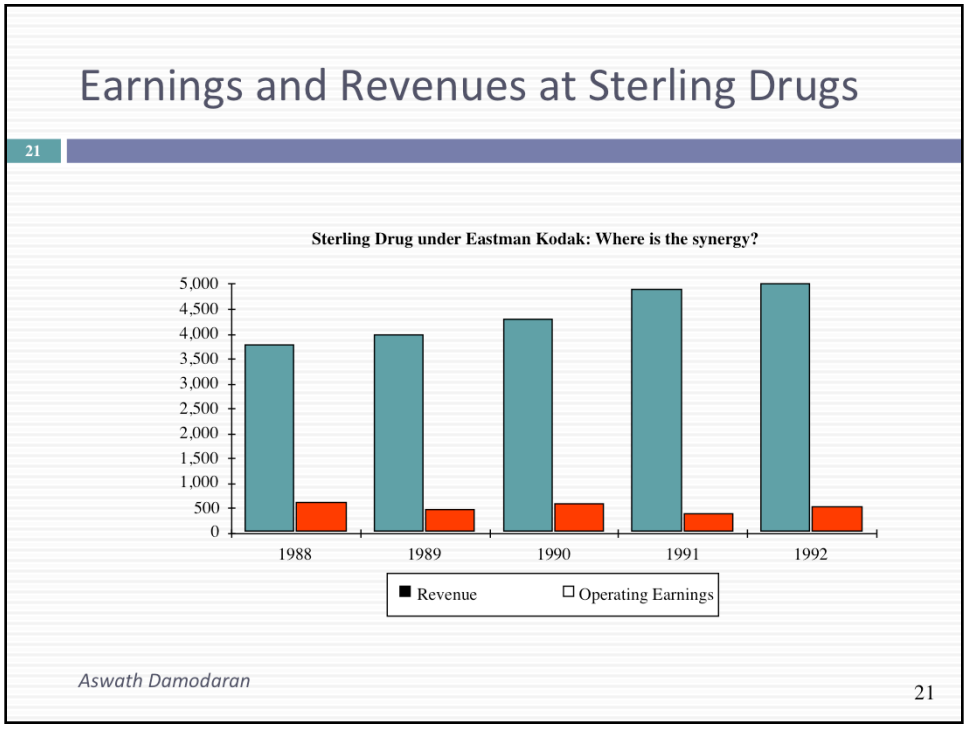
Kodak enters bidding war

- In late 1987, Eastman Kodak entered into a bidding war with Hoffman La Roche for Sterling Drugs, a pharmaceutical company.
- The bidding war started with Sterling Drugs trading at about $40/share.
- At $72/share, Hoffman dropped out of the bidding war, but Kodak kept bidding.
- At $89.50/share, Kodak won and claimed potential synergies explained the premium.

Kodak wins!!!!

Note the difference in stock price behavior of the target and bidding firms.

Note also the symmetry between premium paid over the market price at Sterling Drugs ($ 2.1 billion) and value lost at Kodak ($2.2 billion). Kodak argued that this merger would create synergy and that was why they were paying the premium. The market did not seem to see any synergy.



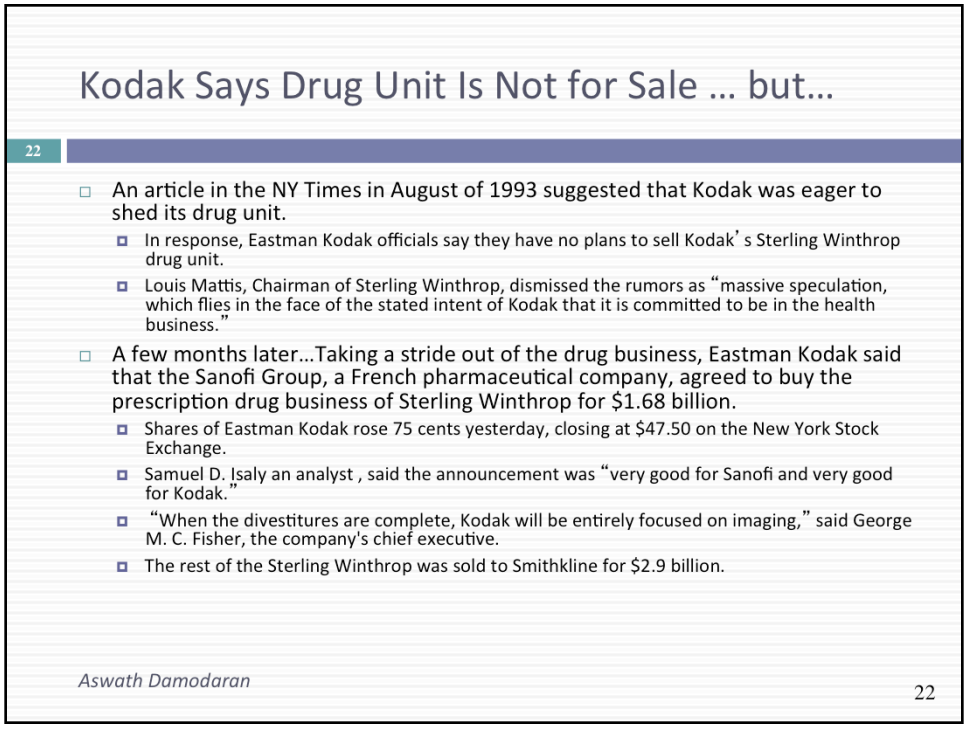
Where is the synergy?

Profits essentially stagnated at Sterling after the Kodak acquisition. The rest of the drug industry reported an annual growth in earnings of 15% a year during this period.

Why is synergy so hard to deliver?

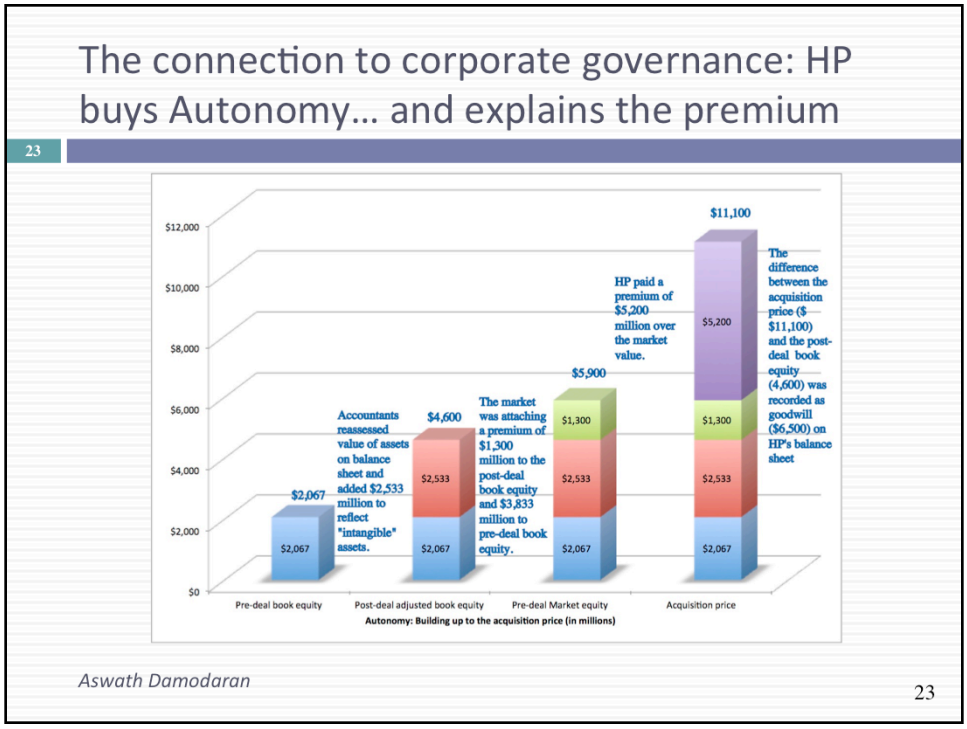
1. Firms do not plan for it at the time of the acquisitions
2. Culture shock
3. Unrealistic assumptions

The added problem is that there is evidence in the literature that over confident CEOs tend to over estimate their powers to deliver results (synergy included) and thus overpay.

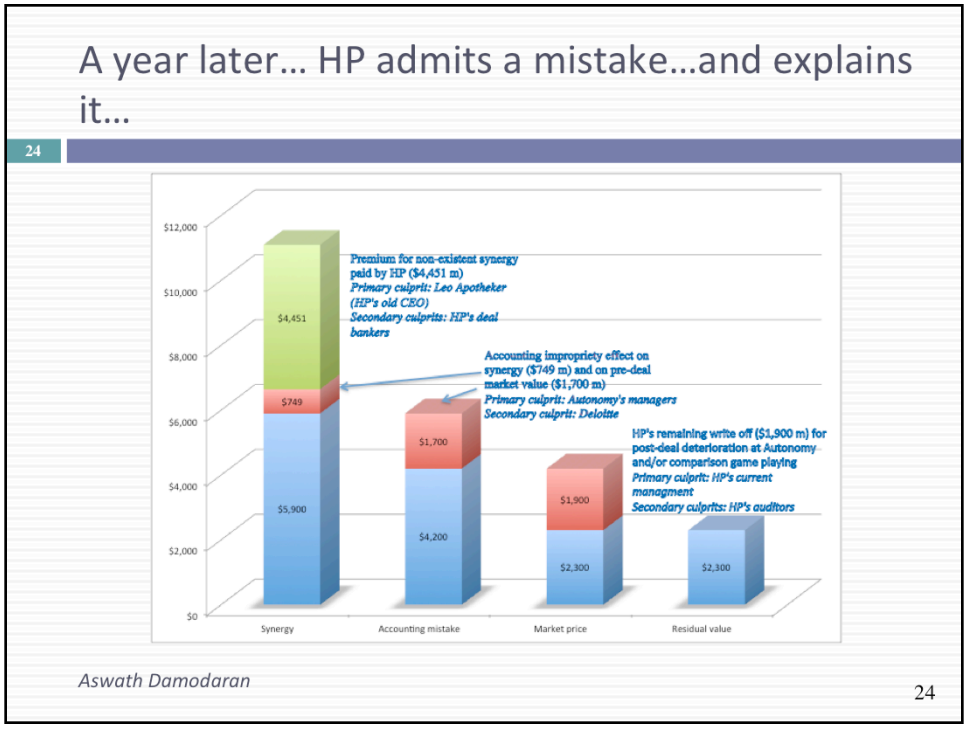


As in the old Soviet Union, nothing is true until it is officially denied.

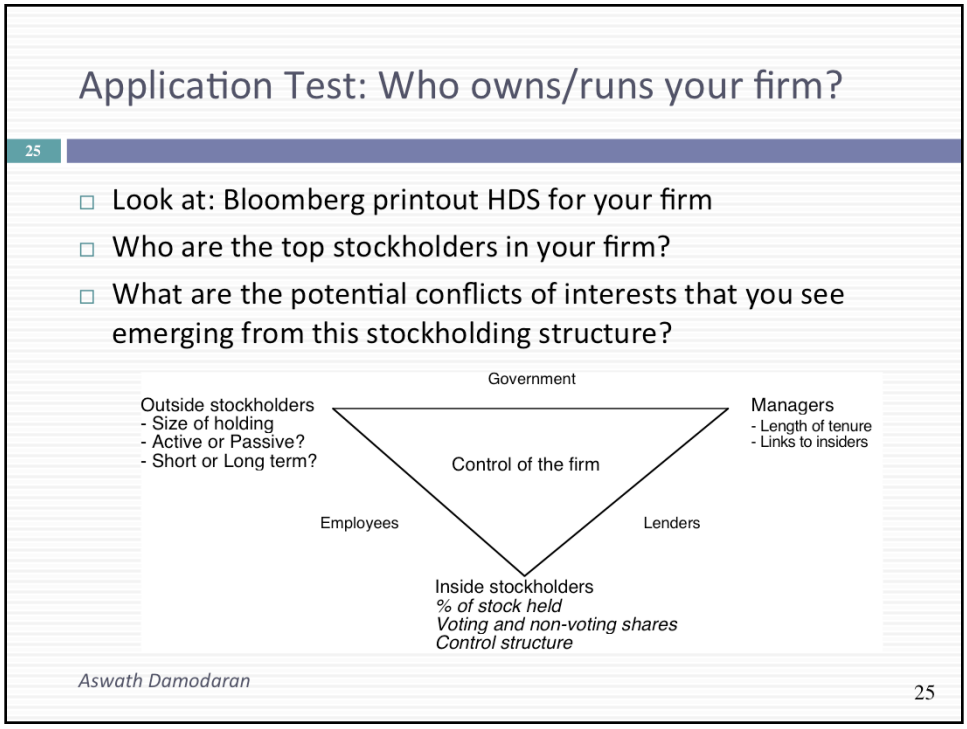
It is also worth noting that analysts sometimes say the most inane things in response to corporate actions and strategic buzzwords will often be offered by corporate chieftains (focus, diversification, synergy, strategic considerations..)



HP acquired Autonomy, a UK-based business software company, for $11.1 billion in 2011. At the time, almost everyone except for HP's management thought that they were paying too much. Leo Apotheker, HP's CEO at the time, claimed that they had done their homework and that the investment bankers had done a DCF and found the deal to be an accretive, good deal. The board of HP went along with the deal… and Meg Whitman was on the board. This is the same board that a year earlier had been caught sleeping on the job as the previous CEO, Mark Hurd, was found to have been involved in personal misconduct… And guess what…. This board met all of the Sarbanes Oxley requirements for independence.



About a year later, HP announced that it was writing off almost $8.9 billion off its original deal value and claimed that Autonomy had cooked the books. This was my attempt to break down the write off, even with the presumption of accounting impropriety. The CEO of HP, Meg Whitman, claimed no responsibility…



One of your first tasks when assessing a company is to see whether managers have a significant stake in the company. You can get this information in a variety of places. I use Bloomberg to get the data on the top 17 stockholders and go down the list to see if incumbent managers have a stake in the company. I also check to see if there are other investors on the list who may not be incumbent managers but are strong advocates for stockholders - Berkshire Hathaway at Coca Cola, KKR or Blackstone at many publicly traded firms…

You can also get this information from Yahoo! Finance by going into company profiles and clicking on institutional investors…

As you look at the list of top stockholders, you should be also considering the potential conflicts of interest created by the stockholder structure.

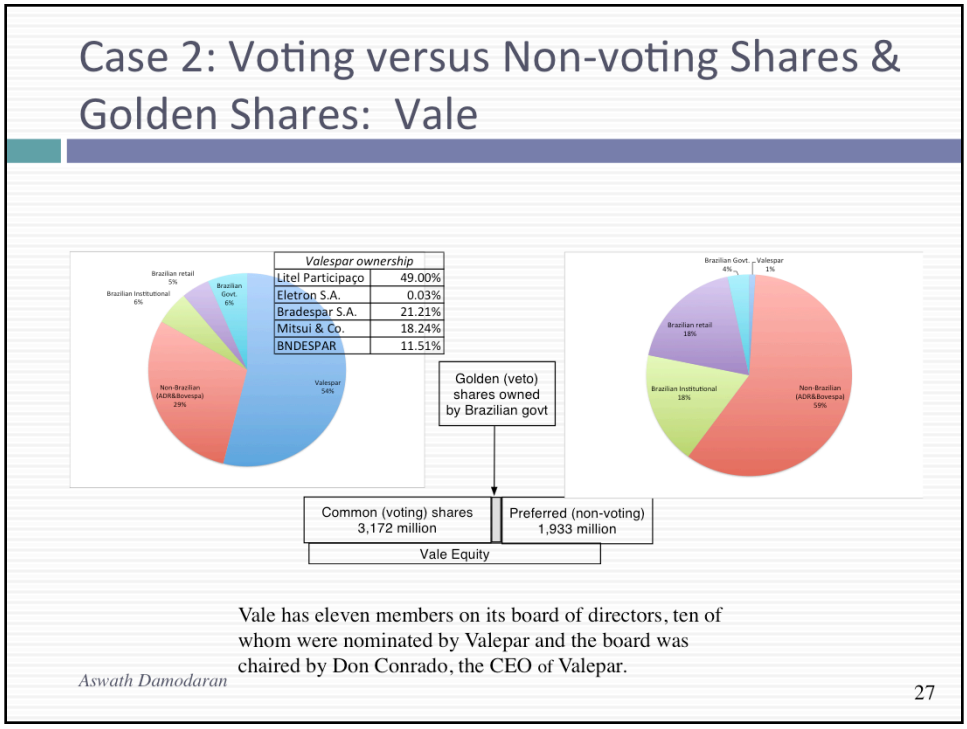
1. Inside stockholders (Founding family, controlling stockholder/manager) versus outside stockholders
2. Government as major stockholder (or holder of golden vote)
3. Employees as major stockholders

If there are multiple classes of shares, with some classes having higher voting rights than others, check to see whether managers/insiders own a

Case 1: Splintering of Stockholders Disney's top stockholders in 2003

Not a single individual investor in the list other than Roy Disney who was the 15th largest stockholder… Managers are not significant stockholders in Disney (and the same can be said for most large publicly traded firms). Consider the following scenarios:

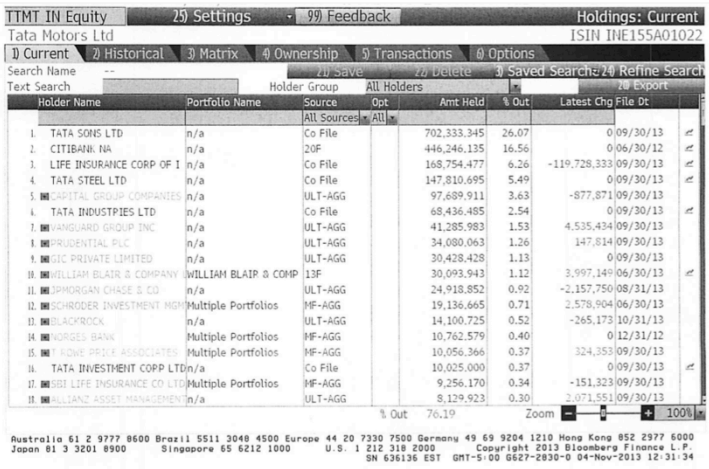
1. Managers are not significant stockholders in the firm: Significant potential for conflicts of interest between managers and stockholders.
2. Individuals are significant stockholders in the firm as well as part of top management. Usually, these are founder-owners of the firm and the firms tend to be younger firms or family run businesses that have recently made the transition to publicly traded firms. Smaller potential for conflict between managers and stockholders, but potential for conflict between inside stockholders and outside stockholders.
3. The government is a large stockholder (or a stockholder with veto power). This may keep managers in some check but it will create potential conflicts of interest between the other stockholders and the government (Consider what would happen if the company tried to minimize taxes paid)
4. Trusts or descendants of owners are significant stockholders in the firm but are not an active part of incumbent management. Power that these stockholders retain to replace managers reduces potential for conflict of interest but is reduced as holdings get diluted among lots of family



Voting right differences: When voting rights vary across shares, incumbent managers can consolidate their hold on a company with relatively small holdings. This reduces the power that stockholders have in these companies. Differences in voting rights are common outside the U.S. In Asia and Latin America, incumbent managers or family members can control companies with relatively small holdings with complete impunity.

Golden shares: When the government has veto power over major decisions, that also acts as a constraint on shareholders. Consequently, shareholders have to be realistic about what they can change and not change at these companies.

Case 3: Cross and Pyramid Holdings
Tata Motor's top stockholders in 2013



TTMT IN Equity | 25) Settings | 99) Feedback | Holdings: Current

Tata Motors Ltd — ISIN INE155A01022

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

Search Name -- | 28) Save | 29) Delete | 30) Saved Searches | 24) Refine Search

Text Search | Holder Group: All Holders | 26) Export

	Holder Name	Portfolio Name	Source	Opt	Amt Held	% Out	Latest Chg	File Dt	
			All Sources	All					
1.	TATA SONS LTD	n/a	Co File		702,333,345	26.07	0	09/30/13	
2.	CITIBANK NA	n/a	20F		446,246,135	16.56	0	06/30/12	
3.	LIFE INSURANCE CORP OF I	n/a	Co File		168,754,477	6.26	-119,728,333	09/30/13	
4.	TATA STEEL LTD	n/a	Co File		147,810,695	5.49	0	09/30/13	
5.	CAPITAL GROUP COMPANIES	n/a	ULT-AGG		97,689,911	3.63	-877,871	09/30/13	
6.	TATA INDUSTRIES LTD	n/a	Co File		68,436,485	2.54	0	09/30/13	
7.	VANGUARD GROUP INC	n/a	ULT-AGG		41,285,983	1.53	4,535,434	09/30/13	
8.	PRUDENTIAL PLC	n/a	ULT-AGG		34,080,063	1.26	147,814	09/30/13	
9.	GIC PRIVATE LIMITED	n/a	ULT-AGG		30,428,428	1.13	0	09/30/13	
10.	WILLIAM BLAIR & COMPANY L	WILLIAM BLAIR & COMP	13F		30,093,943	1.12	3,997,149	06/30/13	
11.	JPMORGAN CHASE & CO	n/a	ULT-AGG		24,918,852	0.92	-2,157,750	08/31/13	
12.	SCHRODER INVESTMENT MGM	Multiple Portfolios	MF-AGG		19,136,665	0.71	2,578,904	06/30/13	
13.	BLACKROCK	n/a	ULT-AGG		14,100,725	0.52	-265,173	10/31/13	
14.	NORGES BANK	Multiple Portfolios	MF-AGG		10,762,579	0.40	0	12/31/12	
15.	T ROWE PRICE ASSOCIATES	Multiple Portfolios	MF-AGG		10,056,366	0.37	324,353	09/30/13	
16.	TATA INVESTMENT CORP LTD	n/a	Co File		10,025,000	0.37	0	09/30/13	
17.	SBI LIFE INSURANCE CO LTD	Multiple Portfolios	MF-AGG		9,256,170	0.34	-151,323	09/30/13	
18.	ALLIANZ ASSET MANAGEMENT	n/a	ULT-AGG		8,129,923	0.30	2,071,551	09/30/13	

% Out 76.19 | Zoom 100%

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2013 Bloomberg Finance L.P.
SN 636136 EST GMT-5:00 G627-2830-0 04-Nov-2013 12:31:34

Aswath Damodaran

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Cross holding structures are often designed with control in mind. In the case of Tata Motors, other Tata companies (which are part of the Tata family group) represent a large number of the top 15 stockholders in the company. (At least the Tatas are up front and open about their cross holding structures… In many Indian companies, the cross holdings are disguised with front companies holding the stock for families).

In Asia and Latin America, corporate holdings structures are designed to consolidate control.

Case 4: Legal rights and Corporate Structures: Baidu

- The Board: The company has six directors, one of whom is Robin Li, who is the founder/CEO of Baidu. Mr. Li also owns a majority stake of Class B shares, which have ten times the voting rights of Class A shares, granting him effective control of the company.
- The structure: Baidu is a Chinese company, but it is incorporated in the Cayman Islands, its primary stock listing is on the NASDAQ and the listed company is structured as a shell company, to get around Chinese government restrictions of foreign investors holding shares in Chinese corporations.
- The legal system: Baidu's operating counterpart in China is structured as a Variable Interest Entity (VIE), and it is unclear how much legal power the shareholders in the shell company have to enforce changes at the VIE.

When you invest in Baidu, you have to do so with the recognition that your rights to make changes in the company or have a say in how it is run are very limited. There have been cases in the last few years, where US investors in companies structured just like Baidu have found that the Chinese courts are not protective of their legal rights.

Things change.. Disney's top stockholders in 2009

30

DIS US $ ↑ 24.2422 +.7422 D 2s EquityHDS
DELAY 14:27 Vol 6,135,972 Op 23.81 Z Hi 24.34 T Lo 23.8 T ValTrd 148.014m
DIS US Equity 95) Saved Searches 96) Default Settings Page 1/150 Holdings Search
Walt Disney Co/The CUSIP 25468710
21) Sources 22) Types 23) Countries 24) Metro Areas 25) Advanced Filters
Name Filter Sort By Mkt Val

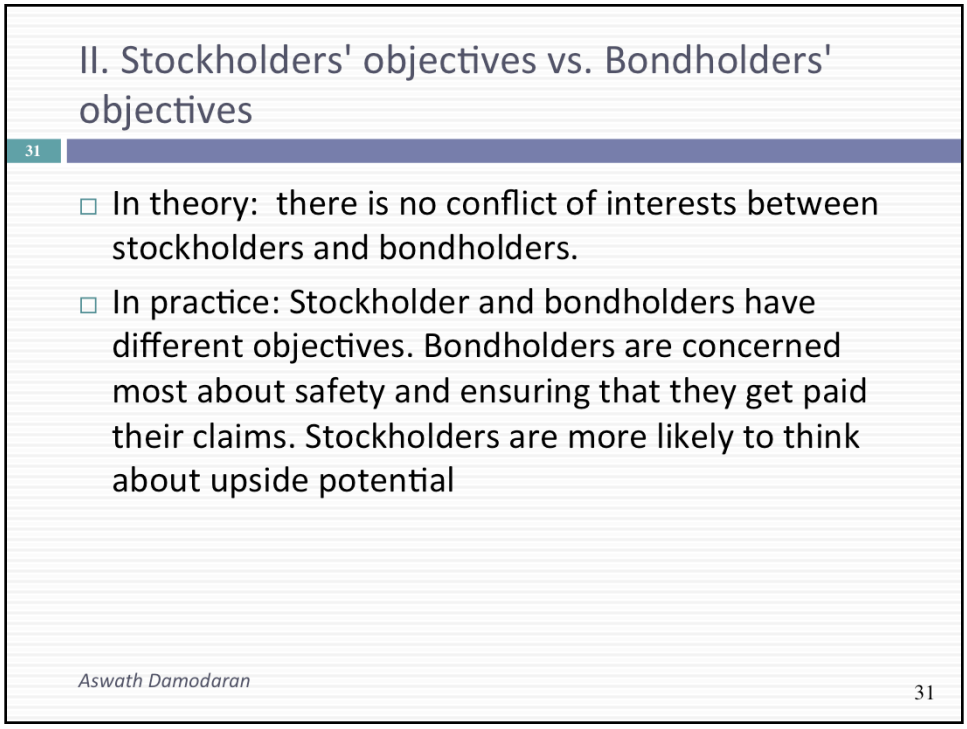
	Holder Name	Portfolio Name	Source	Mkt Val	% Out	Mkt Val Chg	File Dt
1)	JOBS STEVEN PAUL	n/a	Form 4	3.34BLN	7.46	0	5/5/06
2)	FIDELITY MANAGEMENT &	FIDELITY MANAGEMEN	13F	2.05BLN	4.58	-36.12MLN	9/30/08
3)	STATE STREET CORP	STATE STREET CORPO	13F	1.7BLN	3.79	-18.6MLN	9/30/08
4)	BARCLAYS GLOBAL INVES	BARCLAYS GLOBAL IN	13F	1.66BLN	3.70	-160.12MLN	9/30/08
5)	VANGUARD GROUP INC	VANGUARD GROUP IN	13F	1.38BLN	3.08	-6.82MLN	9/30/08
6)	SOUTHEASTERN ASSET M	SOUTHEASTERN ASSE	13F	1.12BLN	2.50	-14.03MLN	9/30/08
7)	STATE FARM MUTUAL AU	STATE FARM MUTUAL	13F	1.02BLN	2.28	0	9/30/08
8)	WELLINGTON MANAGEMEN	WELLINGTON MANAGE	13F	939.38MLN	2.09	110.6MLN	9/30/08
9)	CLEARBRIDGE ADVISORS	CLEARBRIDGE ADVISO	13F	815.91MLN	1.82	-47.04MLN	9/30/08
10)	JP MORGAN CHASE & CO	JP MORGAN CHASE &	13F	693.31MLN	1.55	-18.89MLN	9/30/08
11)	MASSACHUSETTS FINANCI	MASSACHUSETTS FINA	13F	682.16MLN	1.52	112.29MLN	9/30/08
12)	BANK OF NEW YORK MELL	BANK OF NEW YORK	13F	681.68MLN	1.52	-57.13MLN	9/30/08
13)	NORTHERN TRUST CORP	NORTHERN TRUST CO	13F	610.26MLN	1.36	-4.81MLN	9/30/08
14)	AXA	AXA	13F	486.28MLN	1.08	47.05MLN	9/30/08
15)	BLACKROCK INVESTMENT	BLACKROCK INVESTME	13F	476.12MLN	1.06	-47.11MLN	9/30/08
16)	JENNISON ASSOCIATES L	JENNISON ASSOCIATE	13F	428.85MLN	0.96	-102.77MLN	9/30/08
17)	T ROWE PRICE ASSOCIAT	T ROWE PRICE ASSOC	13F	351.61MLN	0.78	-9.94MLN	9/30/08

26) Latest Chg 27) Hist Held % Out on Page 41.12

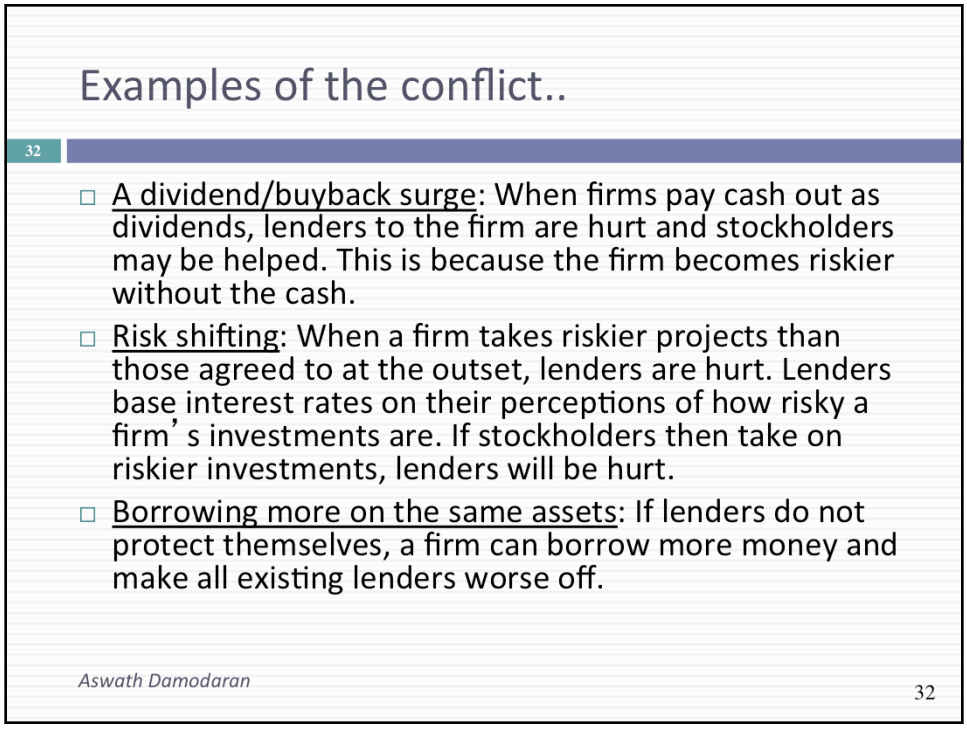
Things can change… This is Disney in 2009. Note that there is now an individual at the top of the list – Steve Jobs, whose holdings came from his majority ownership at Pixar that was acquired by Disney.

As a stockholder in Disney, what would have been your thoughts about Jobs at the top of the list?

Jobs had many shortcomings, but he was a visionary who would have pushed Disney to take another look at its established business practices.



Bondholders include all lenders (including banks). What is good for stockholders is not necessarily good for lenders….



In each of these cases, you are likely to see stock prices go up on the action and bond prices go down. Lenders value stability and security. Equity investors share in upside and may prefer to cash out…

An Extreme Example: Unprotected Lenders?

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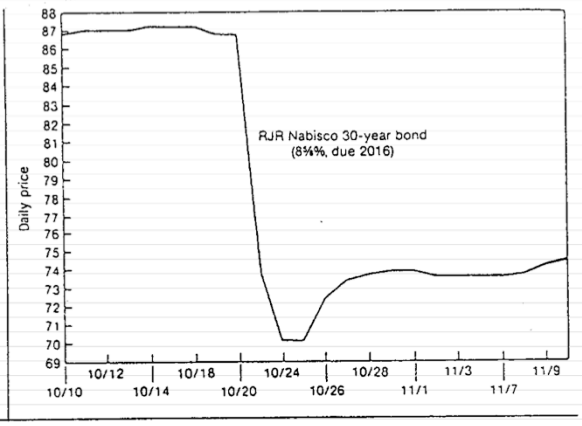
RJR Nabisco's Bonds Sink Following Announcement of the Leveraged Buyout



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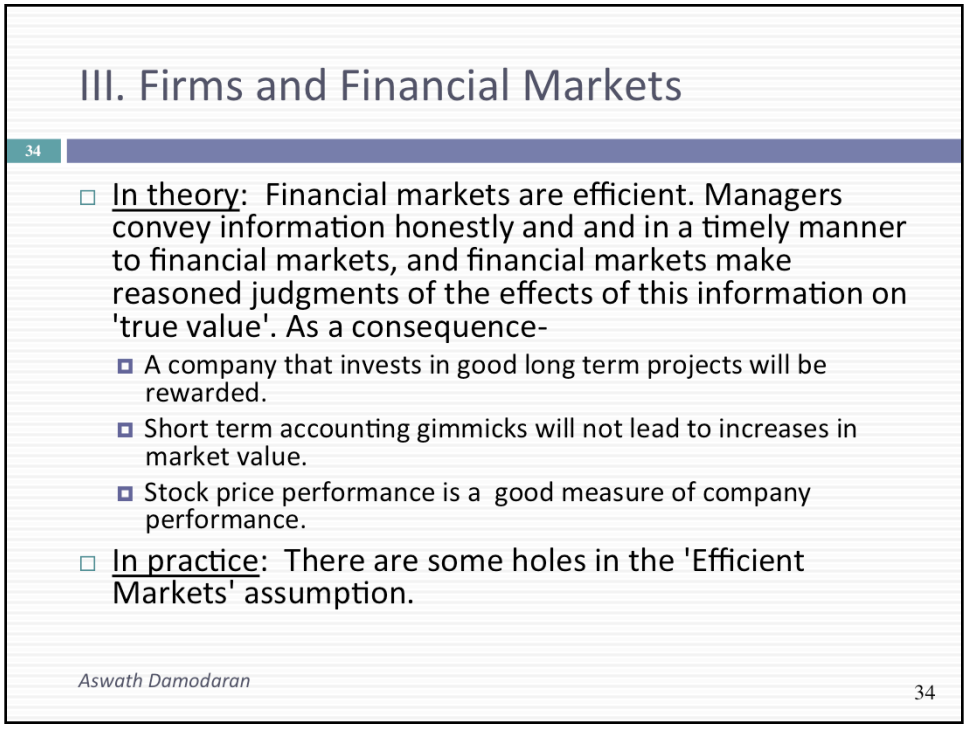
The fact that a company is well known and has a good reputation (as Nabisco did in the early 1980s, when you bought the bond) will not protect you as a lender. Nabisco's bond price plummeted on the day of the LBO, while the stock price soared.

Is this just a paper loss? (You still get the same coupons. Only the price has changed)

> Not really. There is now a greater chance of default in Nabisco, for which you as a lender are not compensated.

How could Nabisco's bondholders have protected themselves?

> Put in a covenant that allowed them to turn the bonds into the firm in the event of an event like an LBO and receive the face value of the bond. (Puttable bonds)
>
> Make the coupon payments on the bond a function of the company's rating (Rating sensitive bonds)

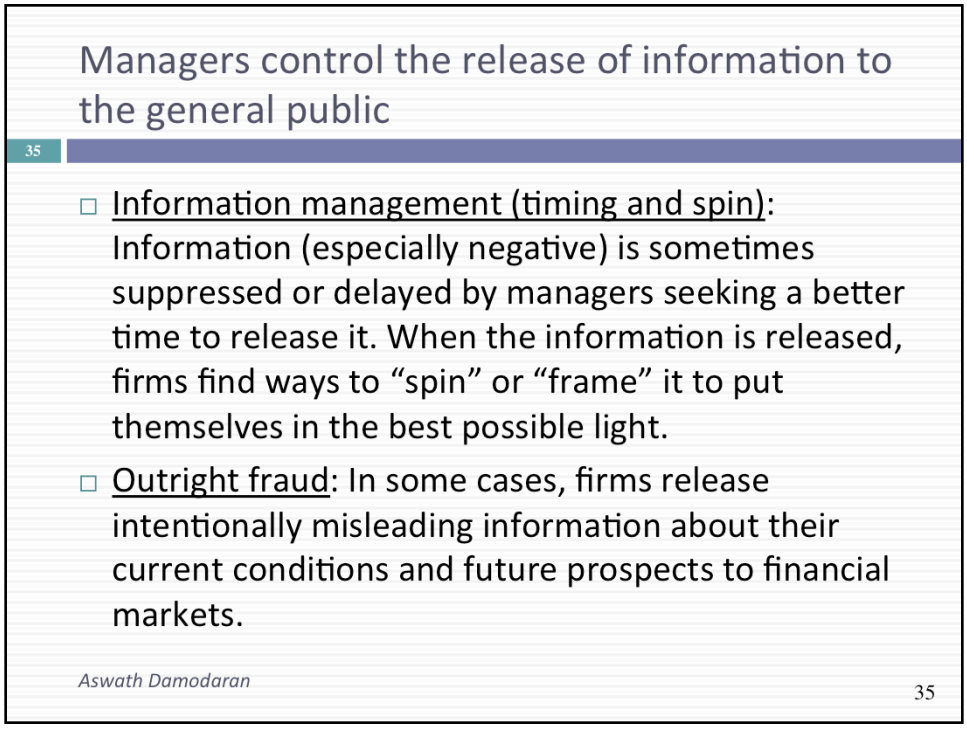


An efficient market is one where the market price reflects the true value of the equity in the firm (and any changes in it). It does not imply perfection on the part of markets, but it does imply a link between what happens to the stock price and what happens to true value.

Note:

a. Efficient markets can and often should be volatile. True values change on a minute by minute basis, and so should the price.

b. Information should still affect prices in an efficient market.



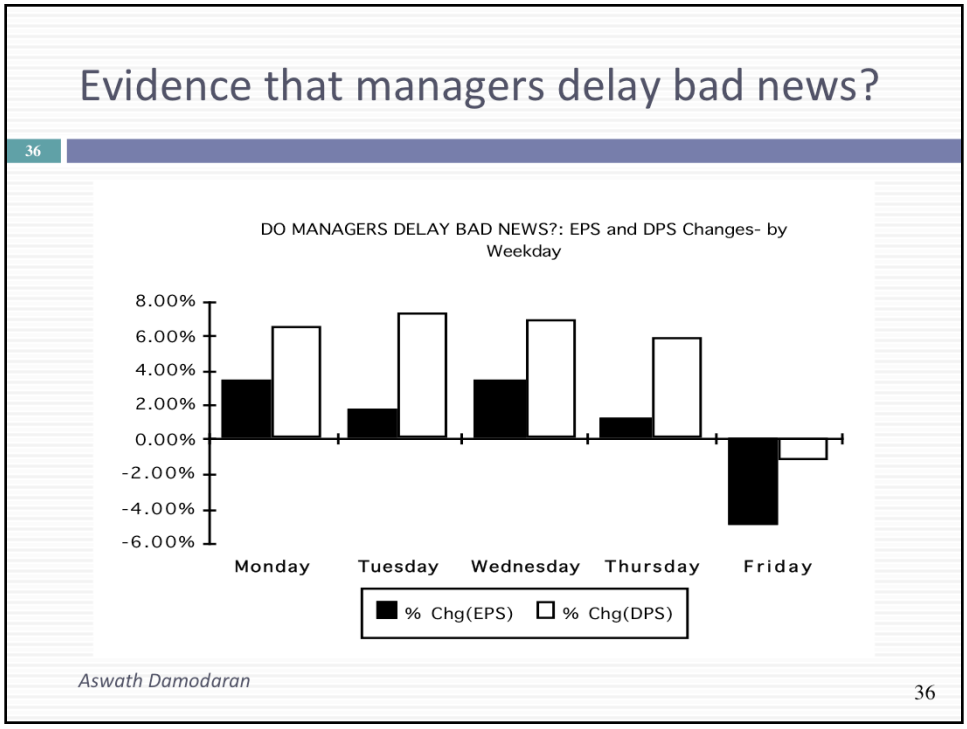
Consider an example of Bre-X, which told markets that it had found one of the largest gold reserves in the world in Indonesia in the early 1990s. In 1997, it was revealed that there was no gold, and that the firm had salted the mine with gold to fool investors. When the news eventually came out, the stock price dropped to zero. Bre-X was followed by 9 analysts, all of whom professed to be shocked by the revelation.

Or Satyam Computer (a CFO who could not find the cash)….Or Mercury Finance (a company that could not find its CFO..) … Or Comverse, the Israeli company that could not find its CEO (until someone spotted him in Sri Lanka… and later in Namibia)

For a non-US example, consider Parmalat, the Italian dairy company. The managers and promoters of the firm went to jail because billions in debt raised by the firm could not be traced.

And there is Enron… and WorldCom… and Tyco…

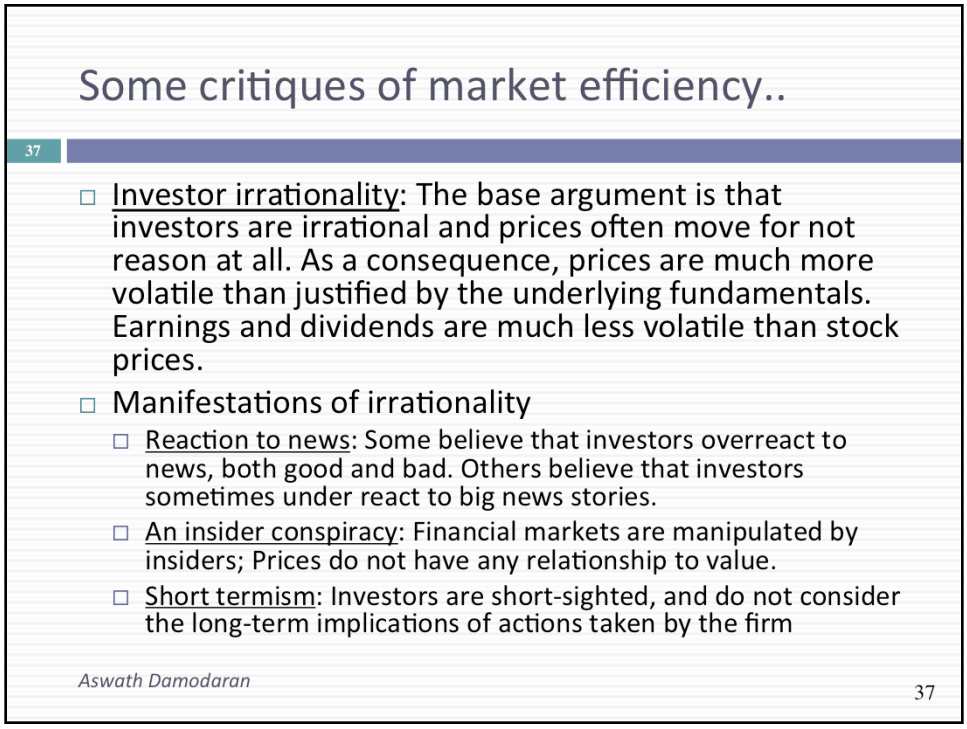
Notwithstanding these examples, outright fraud remains the exception rather than the rule… What is more common is for firms to fudge the truth or to try to control the release of bad news to the market.



This study looked at thousands of earnings and dividend announcements, categorized by day of the week in the 1980s. Note how announcements on Fridays contain far worse news than announcement on the other weekdays. Either bad things tend to happen on Fridays, or managers are trying to hold on to bad news until Friday. I am inclined to believe the latter.

Managers do not trust markets to not panic on bad news.

This may explain a portion of the weekend effect - stock prices tend to go down on Mondays.

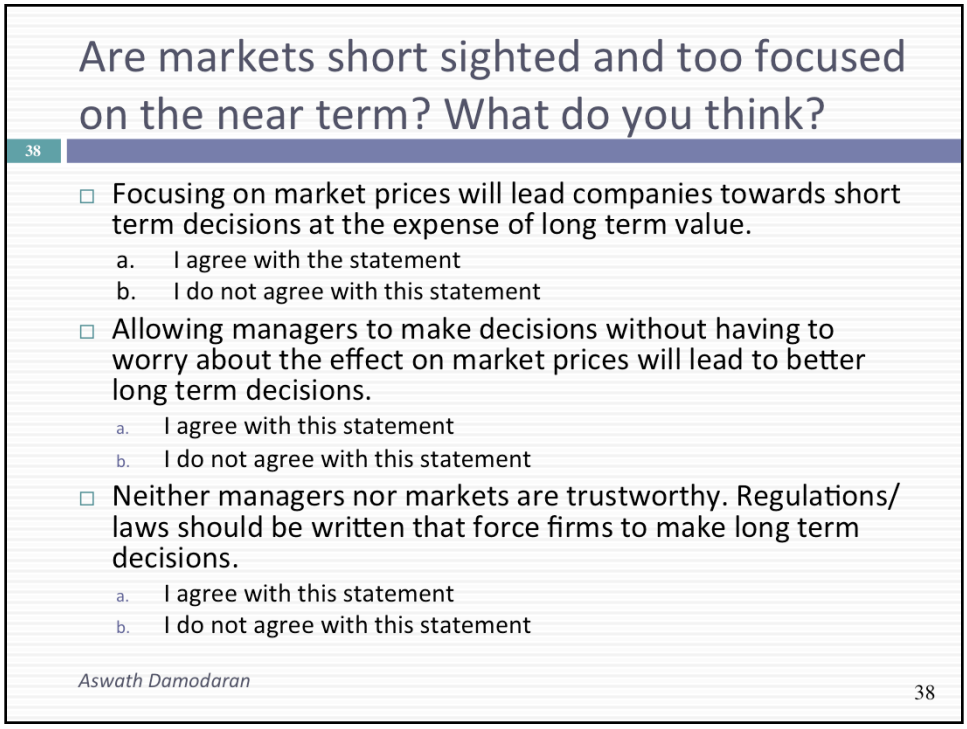


The Shiller effect - stock prices are much volatile than justified by looking at the underlying dividends and other fundamentals - is debatable. While people often present anecdotal evidence on the phenomenon, they under estimate the volatility of the underlying fundamentals.

For every researcher who claims to find evidence that markets overreact, there seems to be another researcher who finds evidence that they under react. And few investors seems to be able to systematically make real money (as opposed to hypothetical money) on these supposed over or under reactions.

Corporate strategists, like Michael Porter, argue that market prices are based upon short term forecasts of earnings and do not factor in the long term.

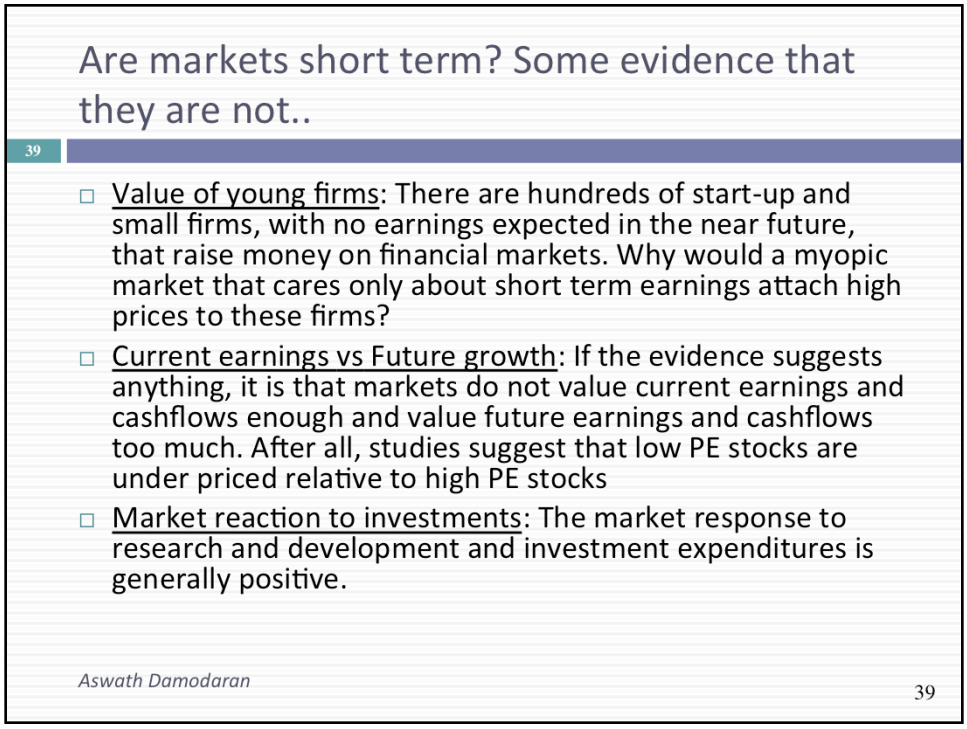
In some emerging markets outside the US, the argument is that prices are moved by insiders and that they have no relationship to value.



This again has no right answers. Most participants, given the barrage of criticism that they hear about markets on the outside, come in with the perception that prices are short term.

However, most people are also unwilling to trust managers to make good long-term decisions, which brings the real problem to the forefront. The question should not be whether you trust the market to be long term, but whether you trust markets more than managers…

The point is that markets are imperfect, but someone has to make the judgments. Managers argue that they do it better. Governments argued (especially in the socialist heyday) that they have a long term focus. The Ministry of Finance in Japan thought it had the monopoly on long term perspective.

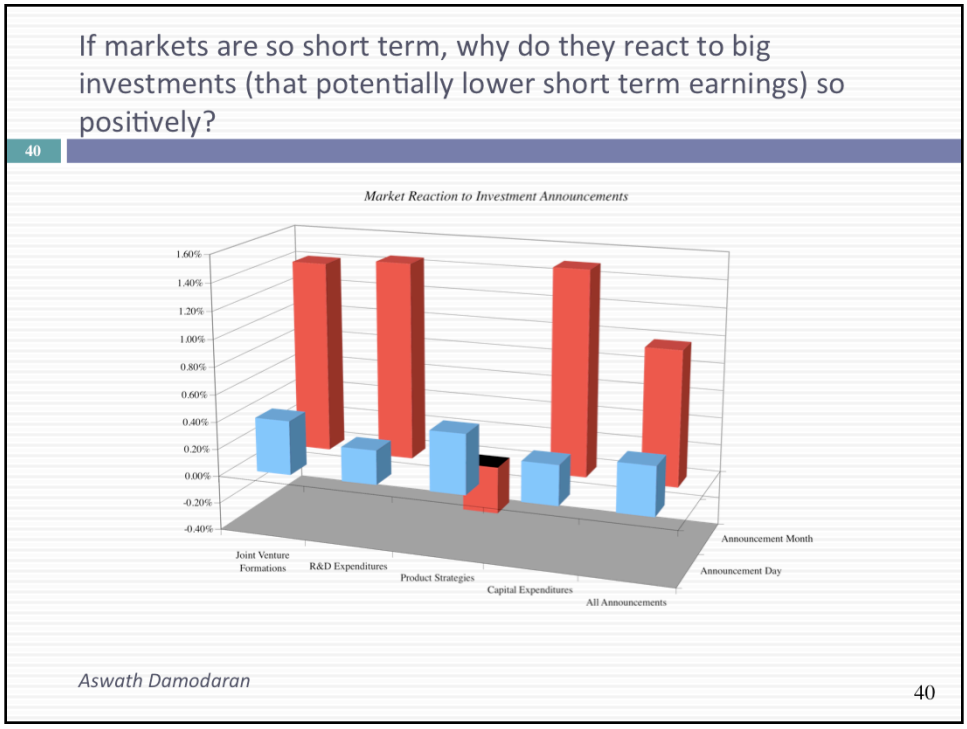


None of these pieces of evidence is conclusive proof that markets are long term, but the evidence does add up to markets being much more long term than they are given credit for. There is little evidence, outside of anecdotal evidence, that markets are short term.

The best support for markets comes from looking at how well they do relative to expert prognosticators:

1. Forward currency rates are better predictors of expected currency rates in the future than economic forecasters.
2. Orange juice futures markets seem to predict the weather in Florida better than weather forecasters.
3. The Iowa Election Market has predicted election results better than political pundits.

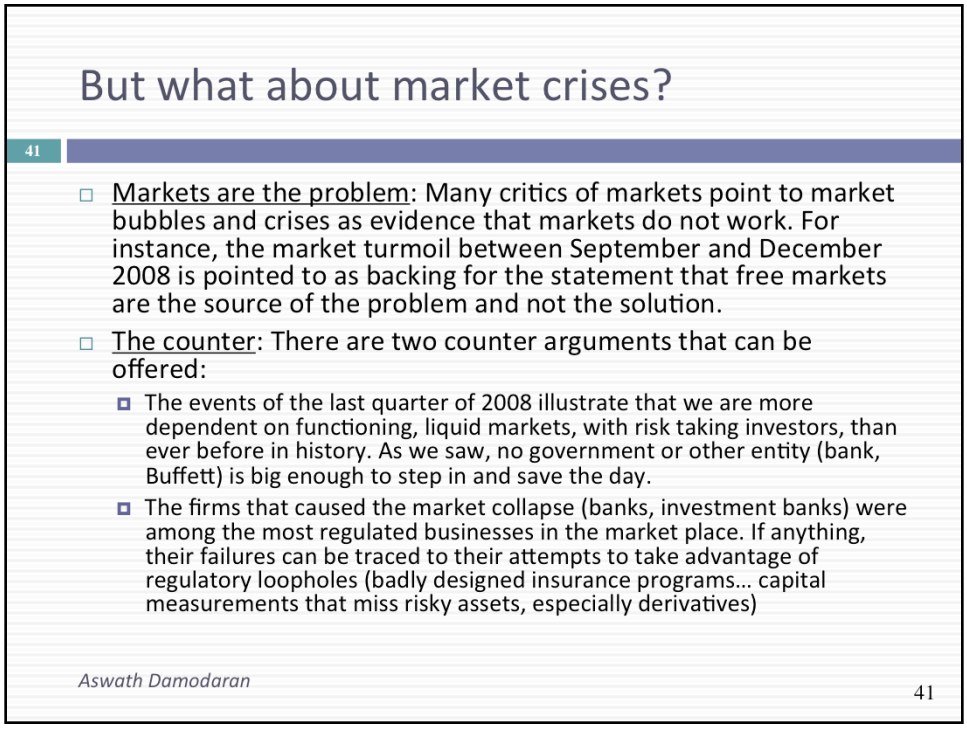
It is true that there are many short term investors and analysts in the market, but the real question is whether the market price is able to get past their short term considerations and focus on the long term. Sometimes, it does not, but surprisingly often, it does.



Note that the price increases tend to be small, since these announcements tend to affect value by only small amounts. The effect seems to correlate with the weightiness of each announcement, being lower for product strategy announcements (which might signify little or no real investment) and being higher for the other three.

Markets also tend to be discriminating and look at both the type of business where the R&D is being spent (Intel versus Kellogg) and the track record of the managers spending the money.

You may argue that investors may be reacting this way because they want to make short term profits and that could be true, but so what? As long as the end-result is a price that reflects long term value, does it matter that what allowed that to happen was greedy, short term investors.

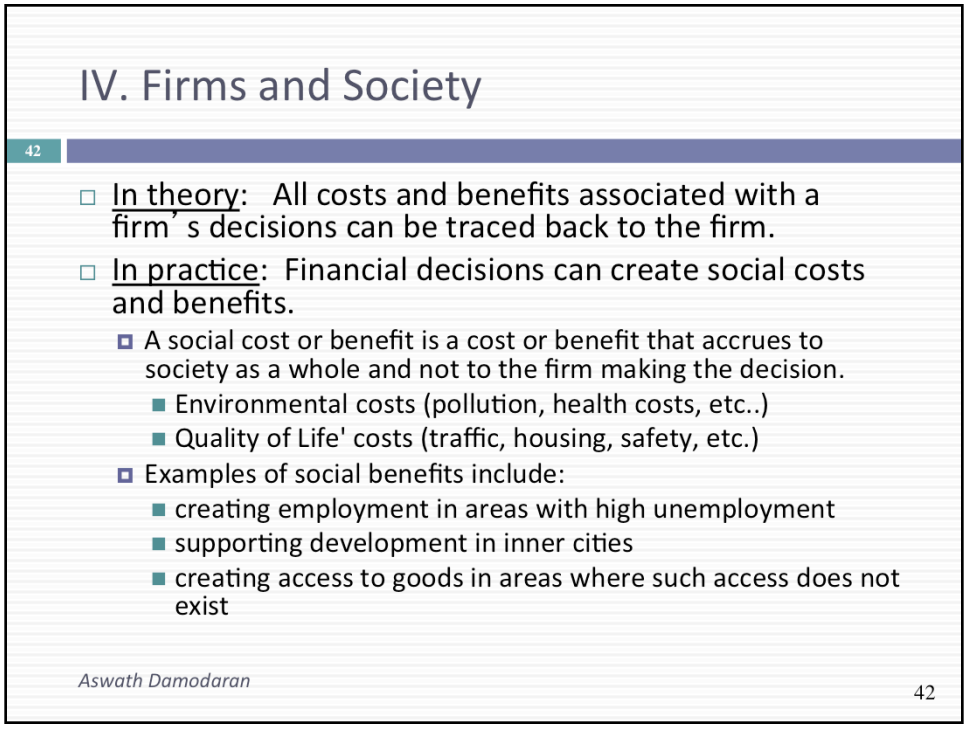


Note that only down markets are viewed as failures.. But not up markets! In other words, we are selective about our outrage. We feed off the positives of markets, attributing success to everything but the presence of markets but when markets fail, we blame their existence.

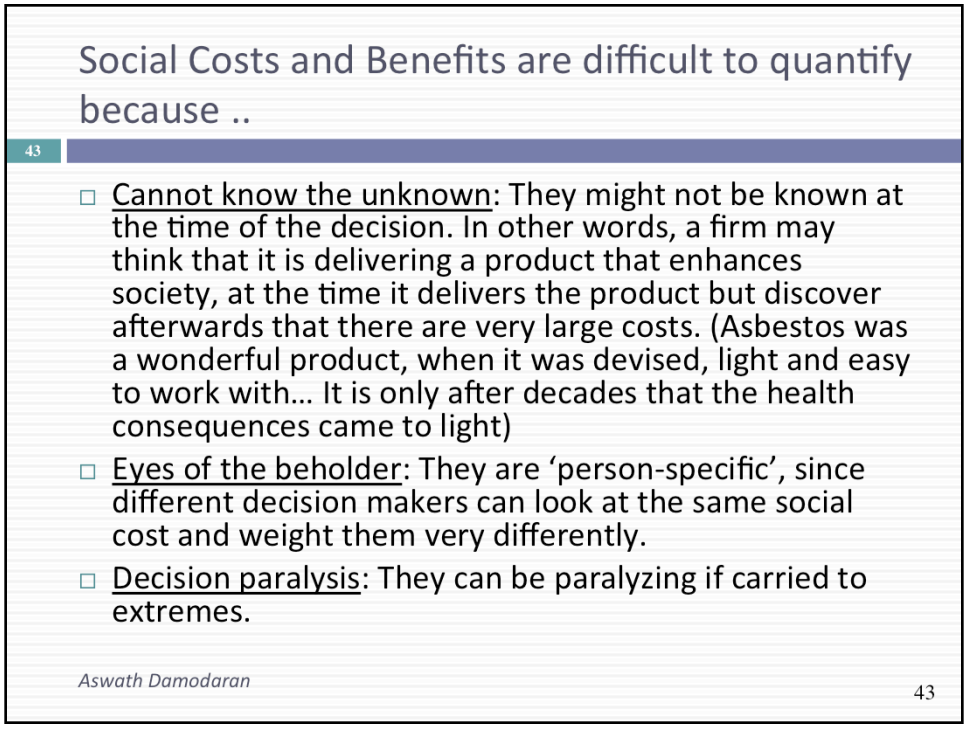
Here is a follow up. If it is market volatility that is the culprit, note that the they reflected some real uncertainty – about economic growth, bank failures and government actions.

As a thought experiment, consider a world without financial markets and ask yourself whether the gains would exceed the losses. (This does not have to be an experiment.. After all, Asia prior to the 1990s was a world without functioning financial markets for millennia… What was the real growth rate in India and China prior to 1995 and pos-1995?)

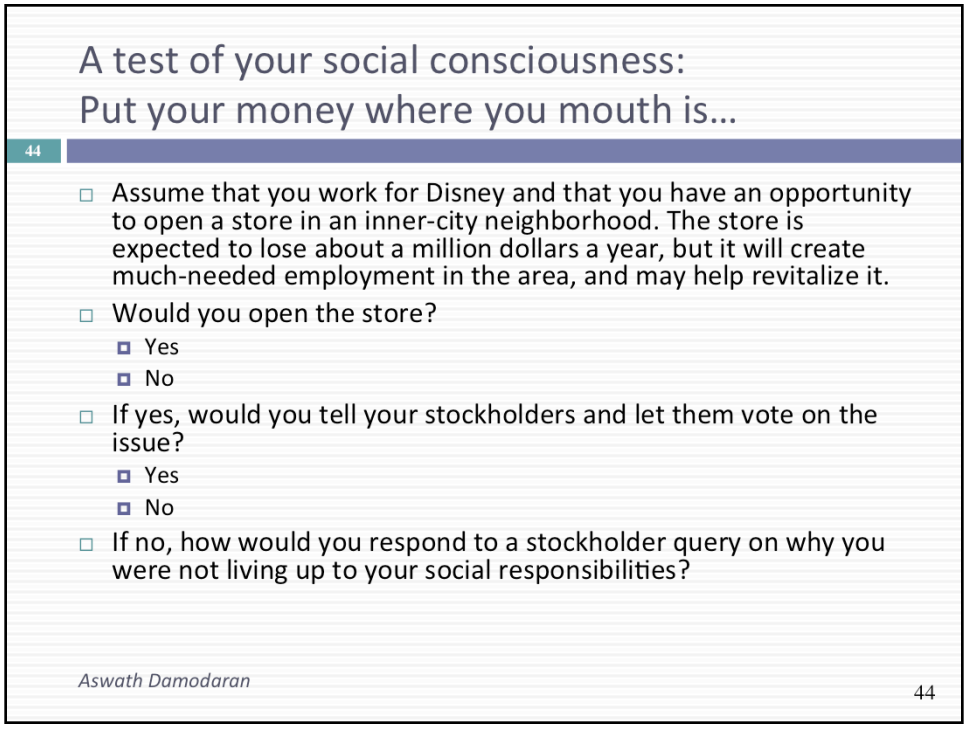
Do I have less trust in markets now than I did a few years ago? Perhaps. But I have even less trust in the other (alternate) institutions that I would have used instead – managers, governments, central banks, experts… This may sound weird. But, on a relative basis, I trust markets more now than I did in September 2008.



Social costs and benefits exist in almost every financial decision.



Economists may measure social benefits in "utils". Few, if any, businesses (or economists) have figured out a way of actually putting this into practice.

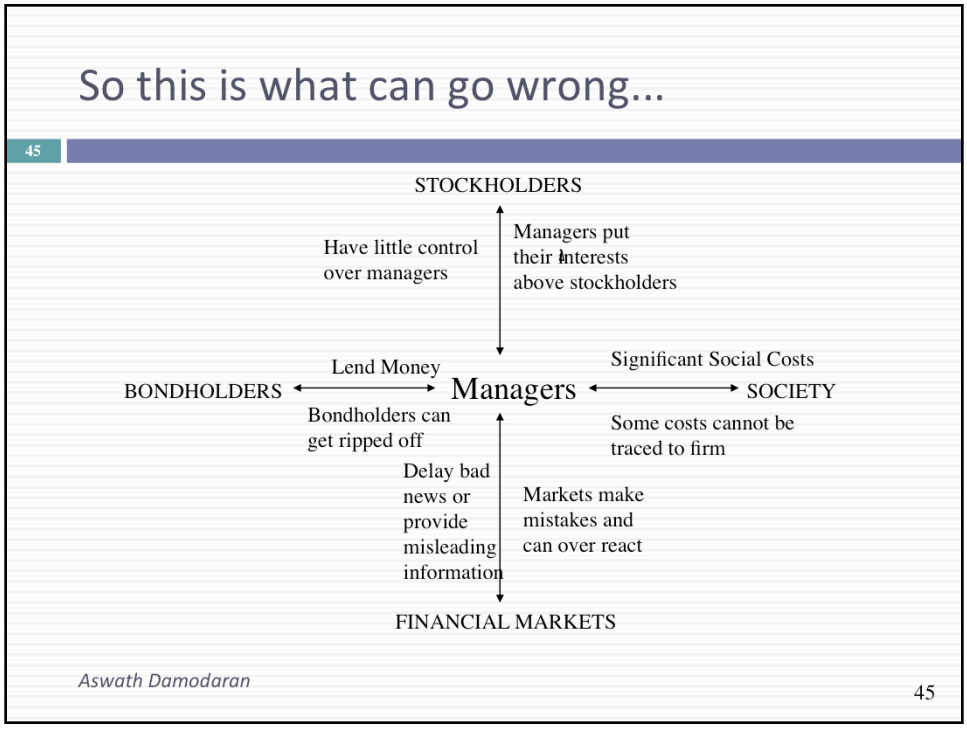


I do this survey in three parts.

First, I allow people to make the choice of whether they would open the store. I then pick someone who would open the store and press them on whether they would reveal this to their stockholders. If the answer is No, I point out that it is after all the stockholders' wealth. If the answer is Yes, I then ask them whether they would let stockholders vote (if not on individual store openings, on the money that the firm will spend collectively on being socially responsible)

I also ask people why they would open the store. If the answer is that they would do it for the publicity, I counter that it is advertising and not social responsibility that is driving the decision. There is nothing wrong with being socially responsible and getting economically rewarded for it. In fact, if societies want to make firms socially responsible they have to make it in their economic best interests to do so.

The bottom line is the following. If you own a private business, you can do whatever you want with your money. If you are a managers of a publicly traded firm, you are being charitable with other people's money. You have an obligation to be open and up-front with your stockholders about how much you are spending to be socially conscious and give them a chance to decide whether you should continue on your path.



This is my worst case scenario:

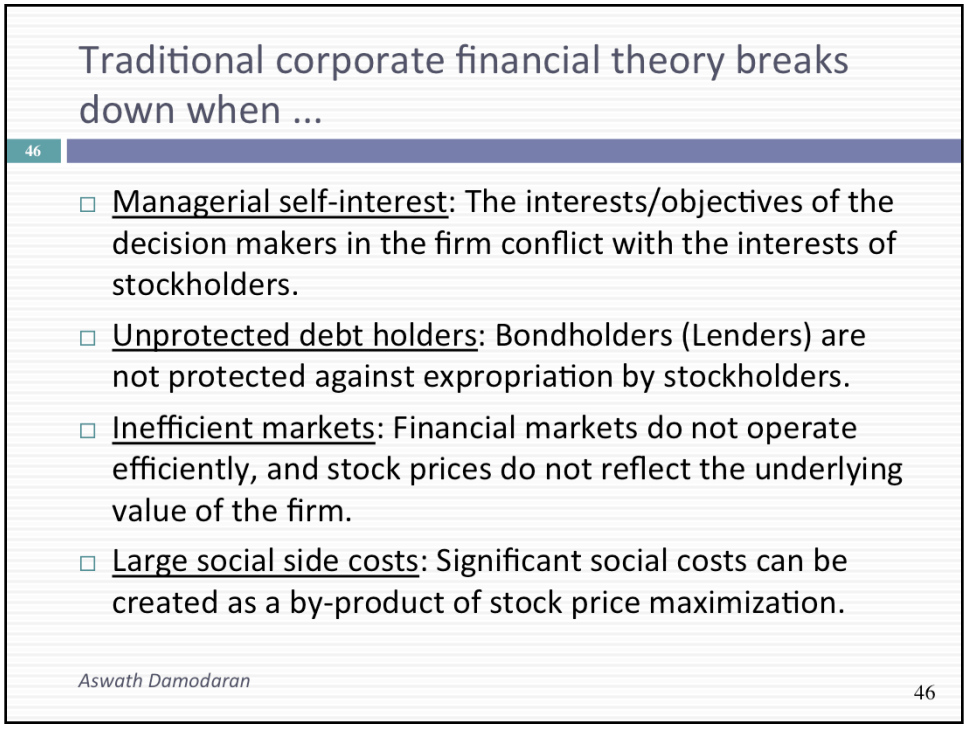
•Stockholders have little or no control over managers. Managers, consequently, put their interests above stockholder interests.

•Bondholders who do not protect themselves find stockholders expropriating their wealth.

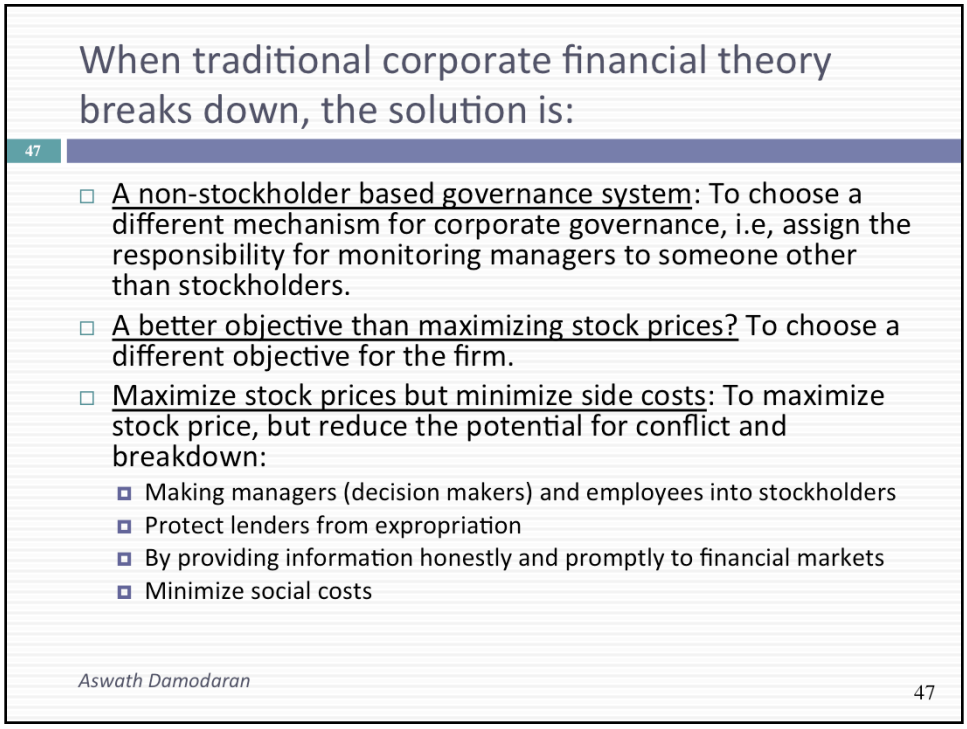
•Information conveyed to markets is noisy, biases and sometimes misleading. Markets do not do a very good job of assimilating this information and market price changes have little to do with true value.

•Firms in the process of maximizing stockholder wealth create large social costs.

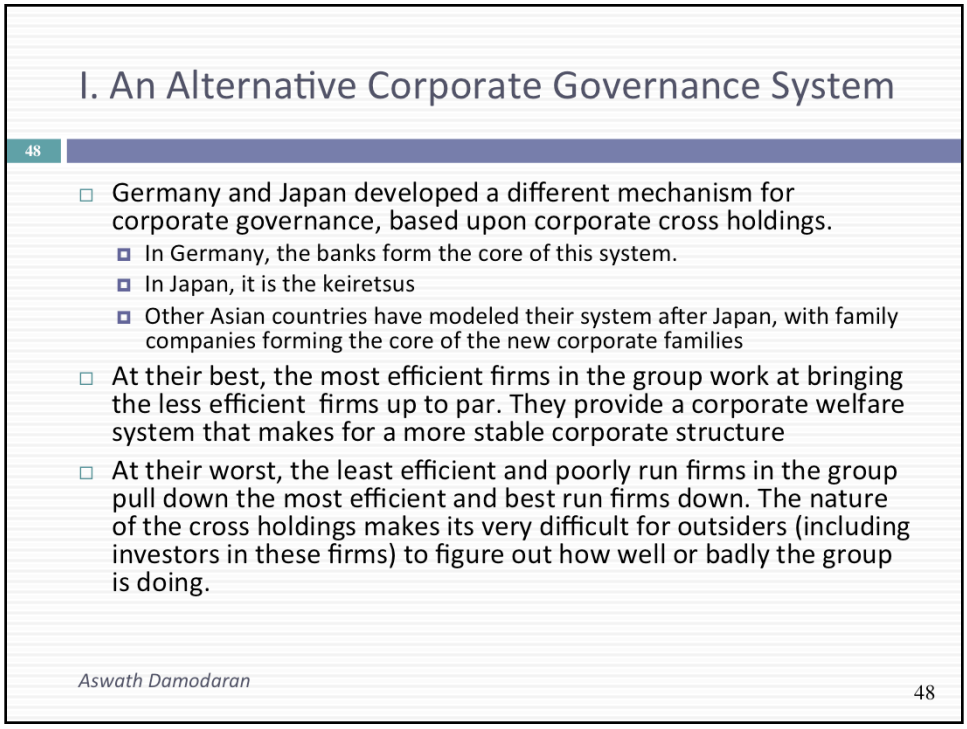
In this environment, stockholder wealth maximization is not a good objective function.



This summarizes the break down in each of the linkages noted on the previous page.



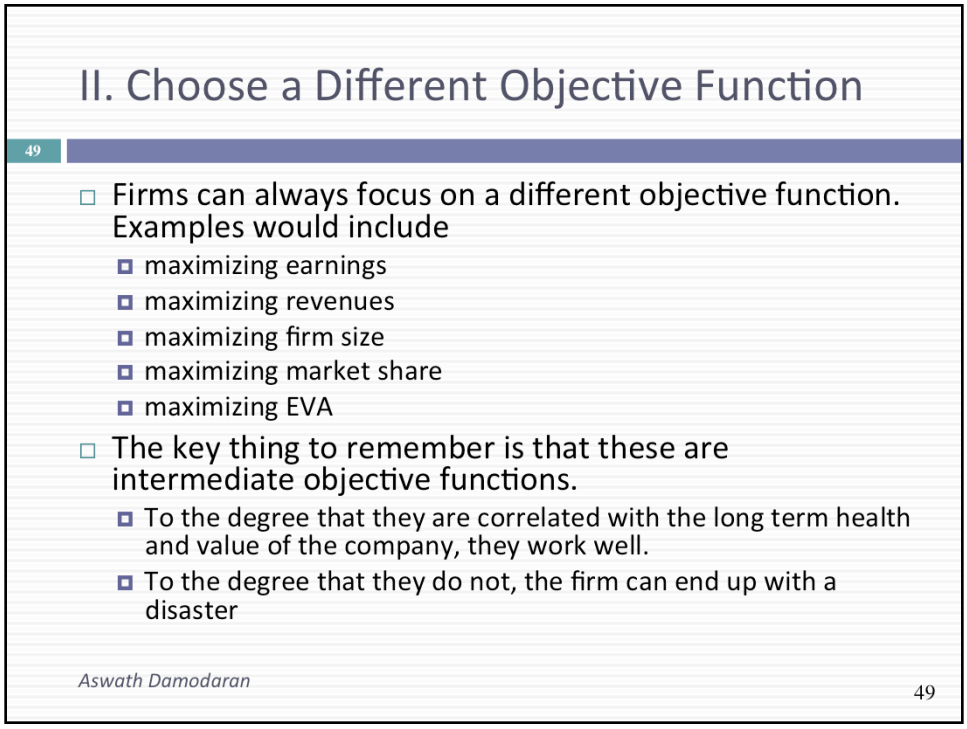
At this point, things look pretty bleak for stock price maximization. These are the three choices that we have, if we abandon pure stock price maximization as an objective function.



In the 1980s, Michael Porter argued that US companies should move towards the Japanese system. The Japanese and German systems tend to do well in stable environments, where failure tends to be unsystematic (a firm here and a firm there). They can take care of their "failures" and nurse them back to health, rather than exposing themselves to the costs associated with failure.

These systems break down when problems are wide spread and systematic. Contrast the way US banks dealt with problem loans on their balance sheets (markets forced them to deal with these problems quickly) and the way Japanese banks have dealt with them (by hiding them and hoping they go away).

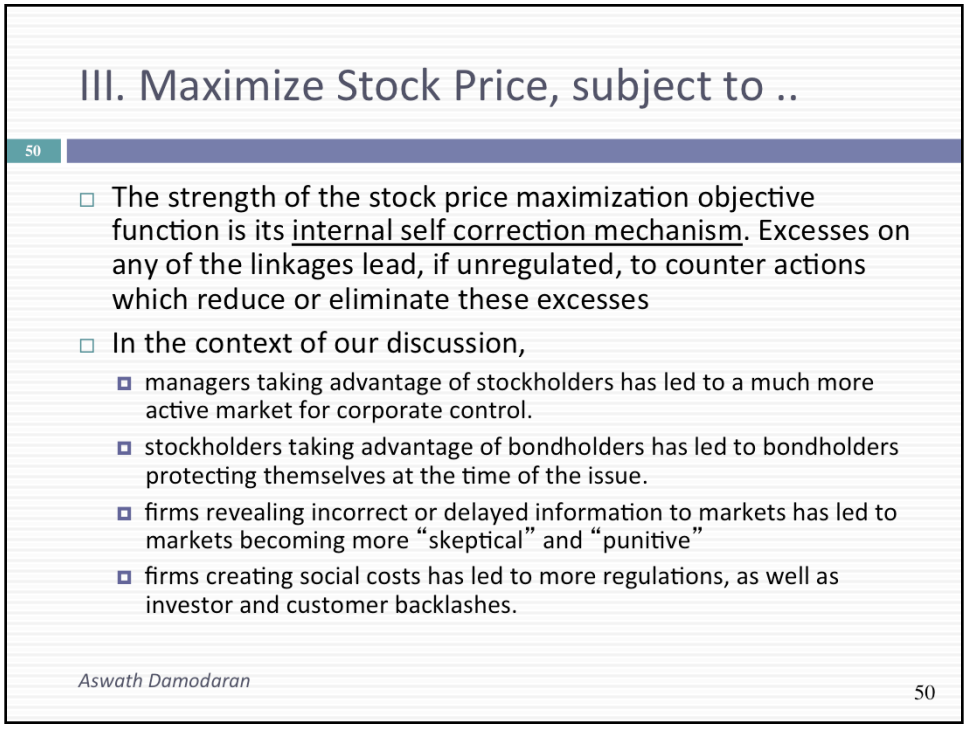
In the last decade, the success of China as an economy has evoked interest in their corporate governance system, which is rooted neither in stockholders nor in cross holding structures. Instead, it has been largely directed by a government or central authority. The plus that the centralized power brings is the capacity to see the big picture and make companies bend to the larger public good. The minus is that centralized powers do make mistakes and when they do, they are reluctant to admit it. The test of a system comes not during periods of success but during periods of failure, and the Chinese system has not been tested yet. Let's see how it holds up.



Consider each of these objectives. If you put them through the same tests that we did stock price maximization, you come up with far more problems with each.

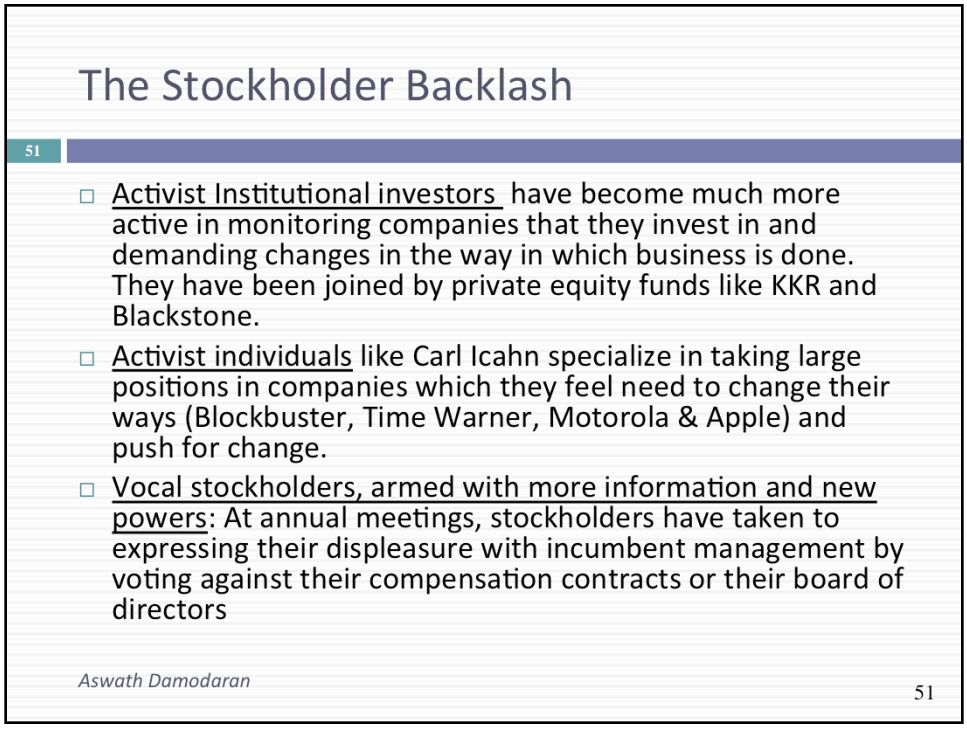
Note that firms might pick an intermediate objective (like market share) when it is correlated with firm value but continue to use it, even after it loses this link. Do you want a 100% market share of a losing business?

In the 1980s, American Airlines (under Robert Crandall) set itself the objective of becoming the number one domestic airline in the United States. It succeeded but by 1989, it was losing billions.



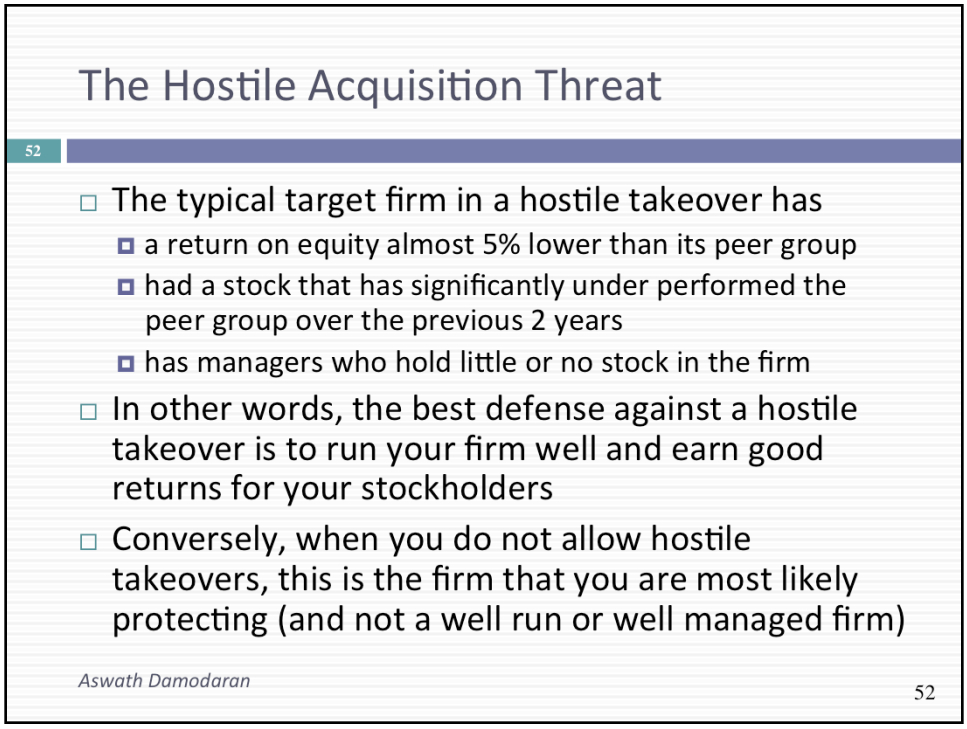
The strength of market based systems is that they are both ruthless and quick in correcting errors, once they are spotted.

These constraints flow from the earlier framework, where we introduced what can go wrong with each linkage.



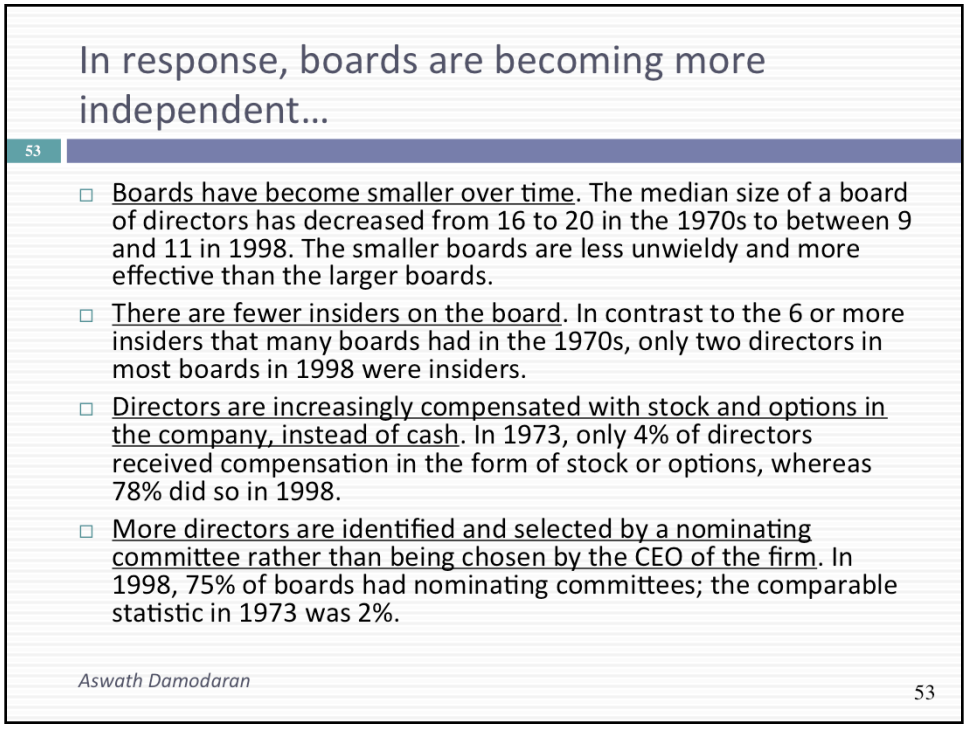
All of these developments represent the backlash to managers putting their interests over stockholder interests.

In recent years, private equity investors have joined the fray as activist investors pushing managers to change the way they run their firms.



This is the ultimate threat. Managers often have deathbed conversions to become advocates for stockholder wealth maximization, when faced with the threat of a hostile takeover.

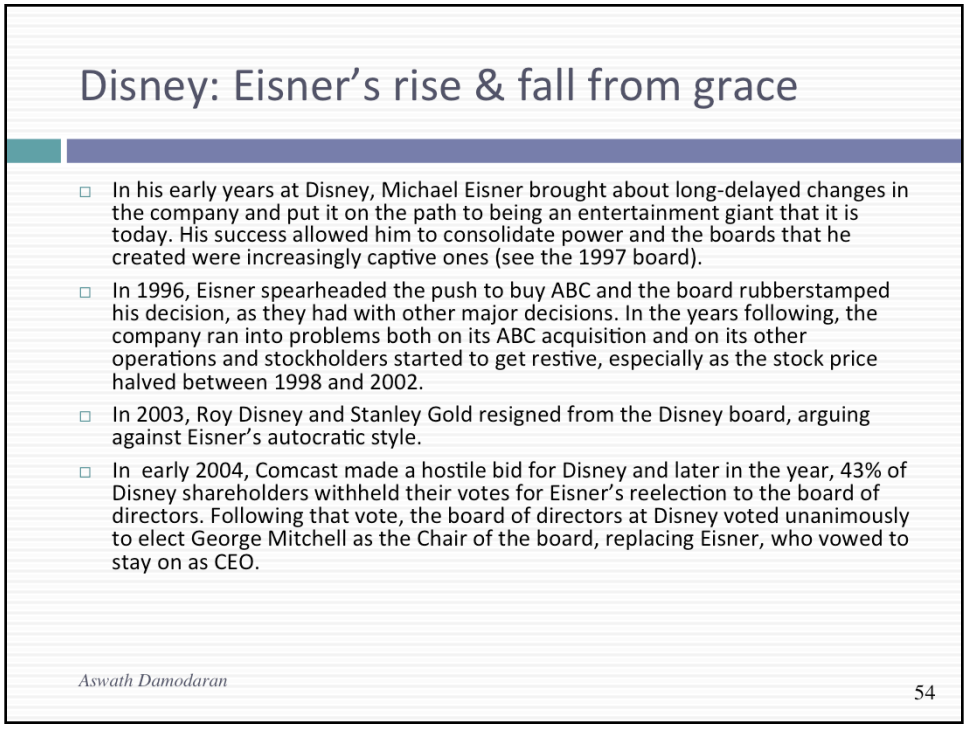
For Disney, this wake-up call came in 2004, when Comcast announced a hostile acquisition bid for Disney. Though the bid failed, it shook up the company and led to Eisner's decision to step down in 2006.



While these trends are positive, note that many of these better boards (at least as seen from the vantage point of 1998) were responsible for the scandals of the bull market (Enron, Worldcom, Tyco…) In bull markets and strong economies, boards tend to get lazy.

The scandals at Enron and Tyco created the impetus for Sarbanes-Oxley, which in turn created a legal mandate for more independent boards..

The annual reports of more and more companies include corporate governance rules that they have adopted.



Eisner was a good CEO when he came into Disney, partly because it was a company badly in need of change and partly because he had a solid COO in Frank Wells, who acted as a counterweight. Two things changed in the 1990s. The first was that Eisner was successful, and the ego boost that he received was the basis for acquiring more power (a compliant board). The second was that Frank Wells dies in an air accident, leaving Eisner as the imperial CEO. Power corrupts and absolute power does so absolutely.

As long as Disney was doing well, though, shareholders were willing to cut Eisner slack. However a bad acquisition followed by under performance (share prices and earnings) gradually ate away that support, until you get to the tipping point which in this case were the resignations and the hostile acquisition bid.

Eisner's concession: Disney's Board in 2003

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

By 2003, stockholders were in open revolt at Disney. A hostile bid by Comcast for Disney was rebuffed by the board, with little discussion of its merits. In the 2004 meeting, 45% of the stockholders voted against Eisner's compensation contract and 23% voted against George Mitchell for Chairman. Some improvement over 1997 but most of the directors are still there…

The most obvious conflict (Irwin Russell) has been removed. Still, there are far too many directors on this board (16), too many of them are still insiders (4) and there are too many CEOs of other firms. The jobs of CEO and Chairman were separated. Nevertheless, this board is a better one than the 1997 board. What precipitated the changes?

1. Poor financial and stock price performance
2. Pressure from major stockholders (like Stanley Gold)
3. Stockholder distrust of management
4. Big deals (like the Cap Cities acquisition) that have gone bad…
5. Enronitis… (the fear that complete power would corrupt and create financial consequences, as it did at Enron)>

Shortly after this filing, Stanley Gold and Roy Disney resigned from the board in protest over its ineffectiveness.

These changes were all welcome but they were being made in response to widespread stockholder anger. They would have been more effective and credible if they had been adopted at the height of Eisner's powers (say, in 1994)….

Eisner's exit… and a new age dawns? Disney's board in 2008

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

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The changes made by Eisner were too little.. Too late,,, and he was forced to leave in 2005, His successor, Bob Iger, has made a break from the past. Note the differences between the board in 2008 and the one in 2004:

1. It is smaller, 12 members instead of 18.
2. There is little overlap between this board and the 2003 board, reflecting the fact that this is now Iger's board and not Eisner's board.
3. The directors with the most obvious conflicts of interests are gone.

The question, though, is an open one. As Iger becomes entrenched as CEO, will be find directors who are beholden to him?

In 2011, Iger announced his intention to step down as CEO.

But as a CEO's tenure lengthens, does corporate governance suffer?

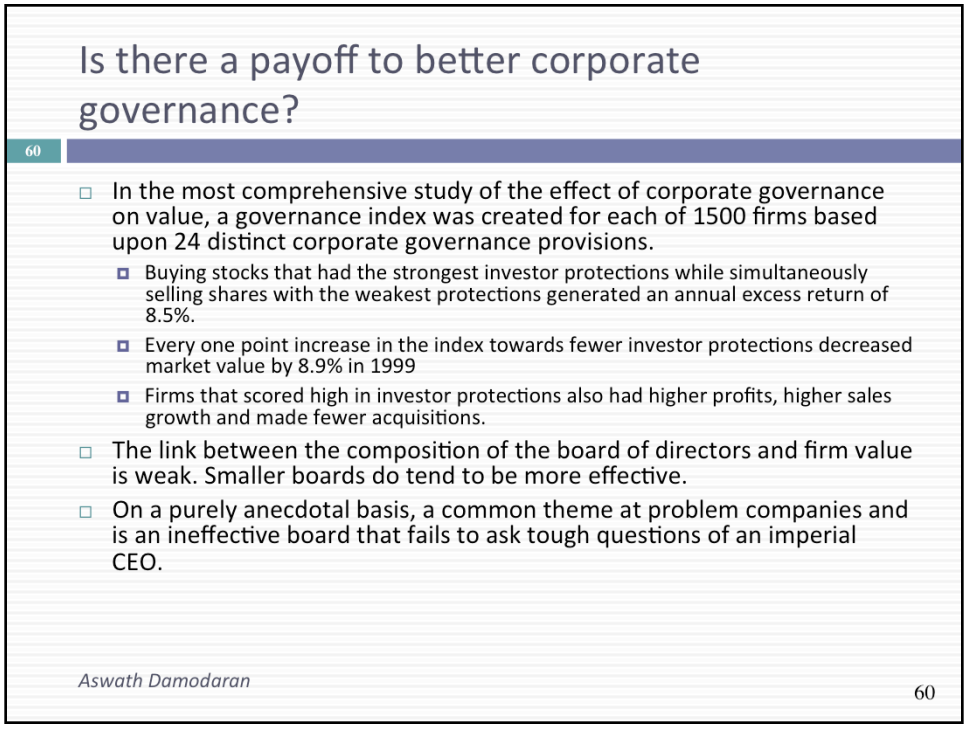
1. While the board size has stayed compact (at twelve members), there has been only one change since 2008, with Sheryl Sandberg, COO of Facebook, replacing the deceased Steve Jobs.
2. The board voted reinstate Iger as chair of the board in 2011, reversing a decision made to separate the CEO and Chair positions after the Eisner years.
3. In 2011, Iger announced his intent to step down as CEO in 2015 but Disney's board convinced Iger to stay on as CEO for an extra year, for the "the good of the company".
4. There were signs of restiveness among Disney's stockholders, especially those interested in corporate governance. Activist investors (CalSTRS) starting making noise and Institutional Shareholder Services (ISS), which gauges corporate governance at companies, raised red flags about compensation and board monitoring at Disney.

Iger was prevailed upon to change his mind, but it is clear that he did not need much convincing. The longer the tenure of a CEO, the more power he or she accumulates. Perhaps, we need term limits for CEOs.

While the motives for passing these laws may be good, there are significant costs. Sarbanes-Oxley has created new business for consultants, corporate governance experts and lawyers but it is debatable whether it has made boards more effective. In fact, while laws can require that directors be independent, it cannot force them to be competent.

You can try suing managers and directors who do not do their job but it is difficult to win. Disney's stockholders sued in a Delaware court over the Ovitz fiasco, arguing that directors had not done their jobs. The court largely agreed with them on the failures of directors but ruled against the stockholders because the directors acted in good faith.

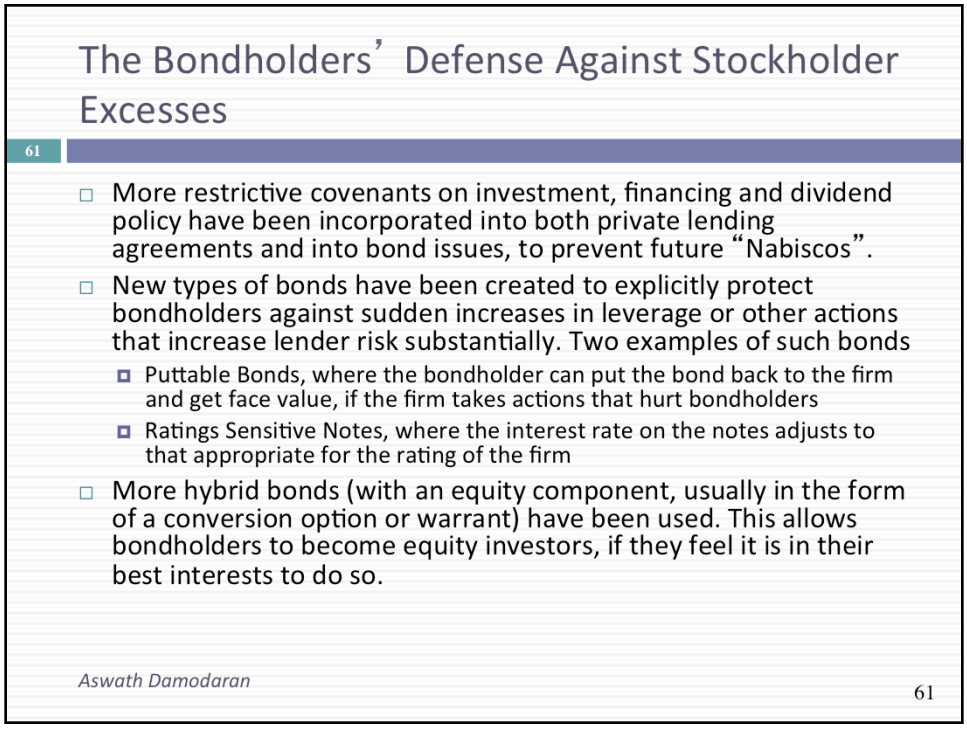
Ultimately, the best antidote to poor corporate governance is a stockholder base that takes its responsibilities seriously. Mutual funds need to think like stockholders and take a role in overseeing management (or at least demanding accountability).



The bottom line is this. Changing the way boards of directors are chosen cannot change the way companies are governed. You need informed and active stockholders and a responsive management to make corporate governance work. When it does, stockholders are better off.

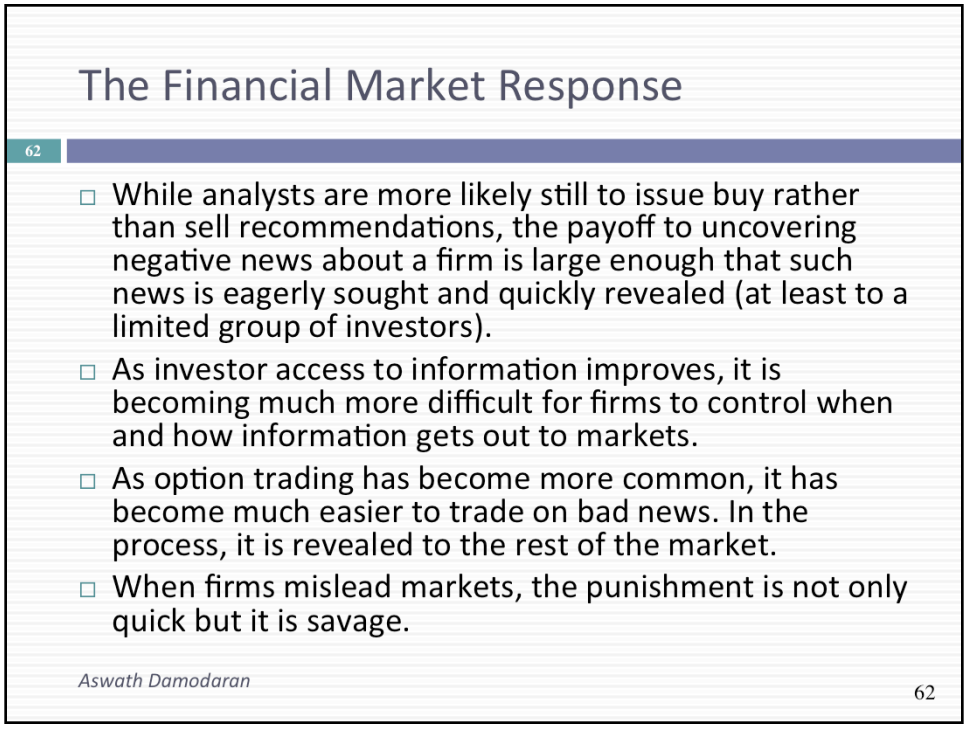
Think of companies that have been destroyed or severely damaged by fraud and scandal over the last decade - Enron, Tyco, Cendant and Worldcom come to mind. In each of these firms, the board was largely ineffective and the top management ran the company.

Perhaps the best indicator that corporate governance matters is that independent services have come into being to measure the strength of corporate governance at companies. (You can get the Corporate Governance Score for many US companies on Yahoo! Finance)



Bondholders, responding to the Nabisco fiasco and other cases where stockholders expropriated their wealth, have become much more savvy about protecting themselves (using covenants or special features added to bonds) or getting an equity stake in the business (as is the case with convertibles).

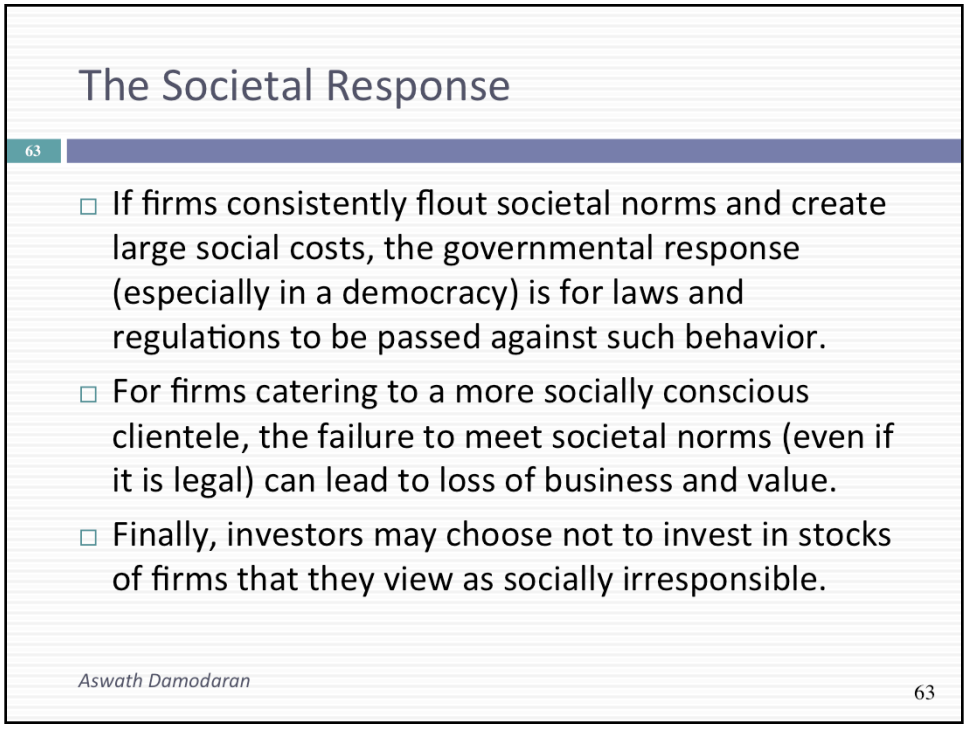
The process never ends, though. A new set of lessons seem to be in order after the banking and loan crisis of 2008: that accounting statements are deceptive, that credit risk can change quickly and that macro problems can very quickly make even safe firms into risky ones. It will be interesting to see how bonds change to reflect these lessons.



The distinction between the US and many foreign markets is the existence of a private market for information. In many countries, firms are the only source of information about themselves, leading to very biased information.

The more avenues there are for investors to trade on information (including option markets), the more likely it is that prices will contain that information. The development of hedge funds (which can go short) and long term put options is good from this perspective. Short term solutions that prevent trading (restrictions on short selling, increased transactions costs) will only make this response less effective.

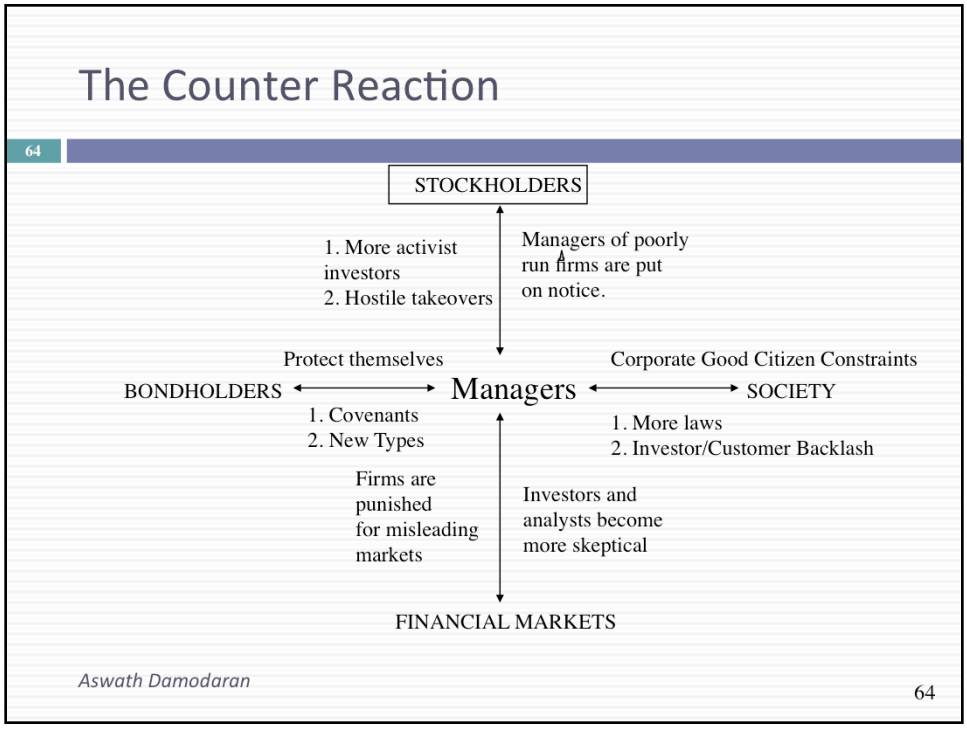
It is also important that investors be allowed to trade on both under and over valuation. In other words, there is nothing bad inherently about short selling and virtuous about being long on a stock.



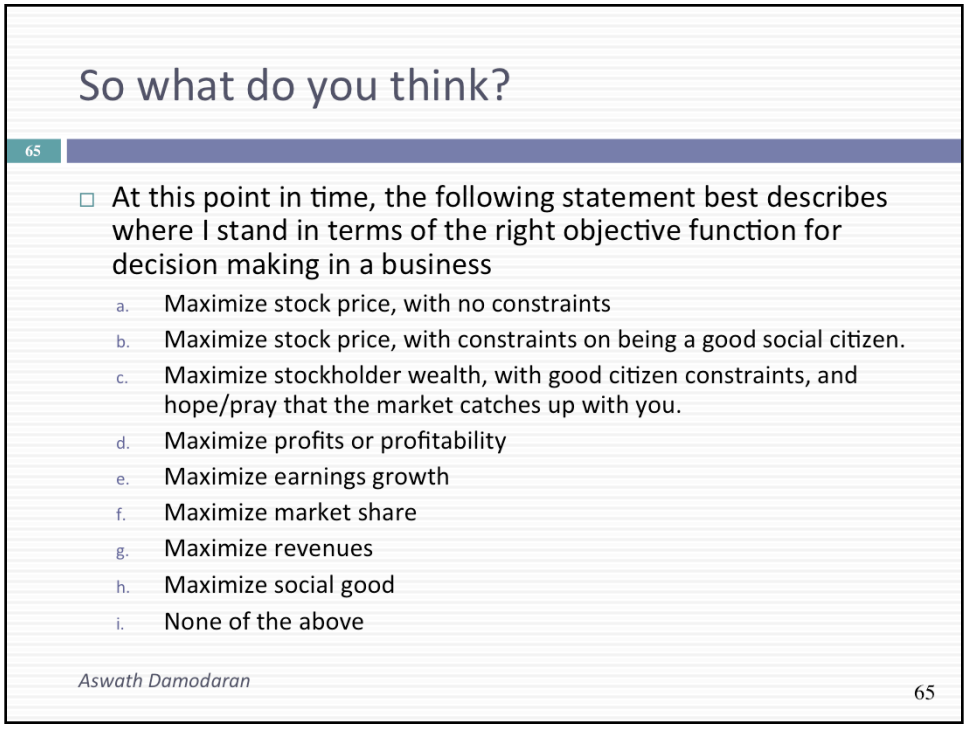
None of these measures is perfect or complete, but they reflect the tug-of-war between private and public interests. Ultimately, if you want companies to be socially conscious, you have to make it in their economic interests to behave as such.

Here are some good examples for each:

1. After the Exxon-Valdez oil spill in the alter 1980s, many states and the federal government tightened regulations on oil tankers… The same is true for tobacco firms, where laws were tightened both on smoking in general and tobacco company advertising in particular.
2. After public interest groups claimed that specialty retailers were using under-age labor to run their factories, many retailers saw sales decline.
3. Many pension funds (and university endowment funds) are restricted from investing in sin stocks.



This summarizes the objective function of maximizing stockholder wealth, with the fixes noted on the last few pages.

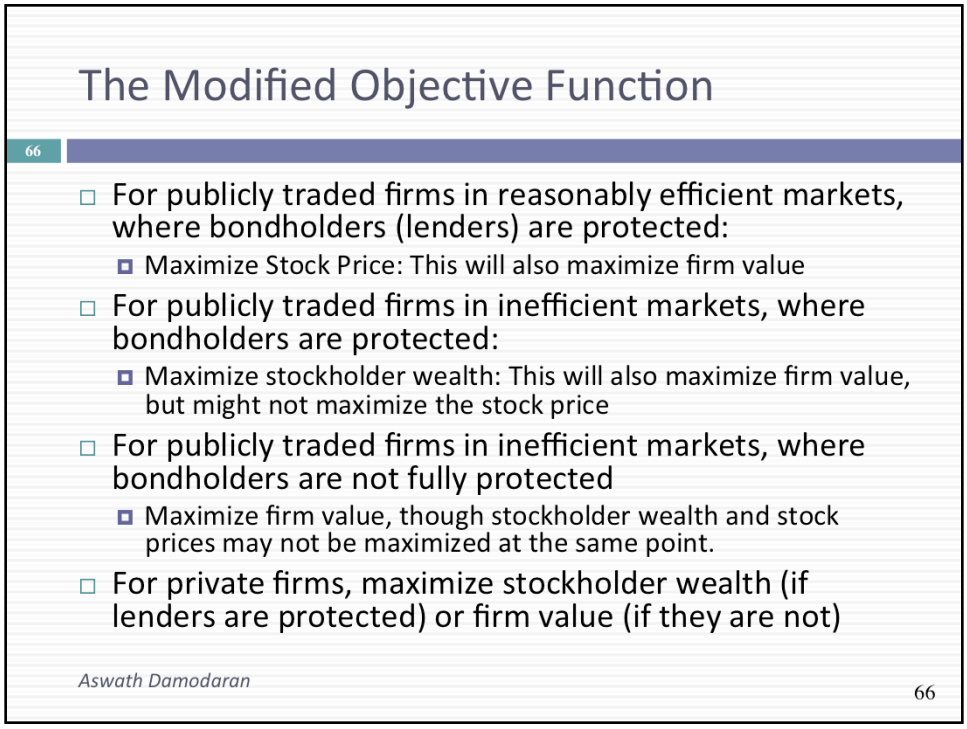


If the sales pitch has worked, and you believe in financial markets, you would choose to maximize stock price, subject to constraint.

If the sales pitch has worked but you remain skeptical about the short term efficiency of markets, you would maximize stockholder wealth.

If it has not, you have a long semester ahead of you.

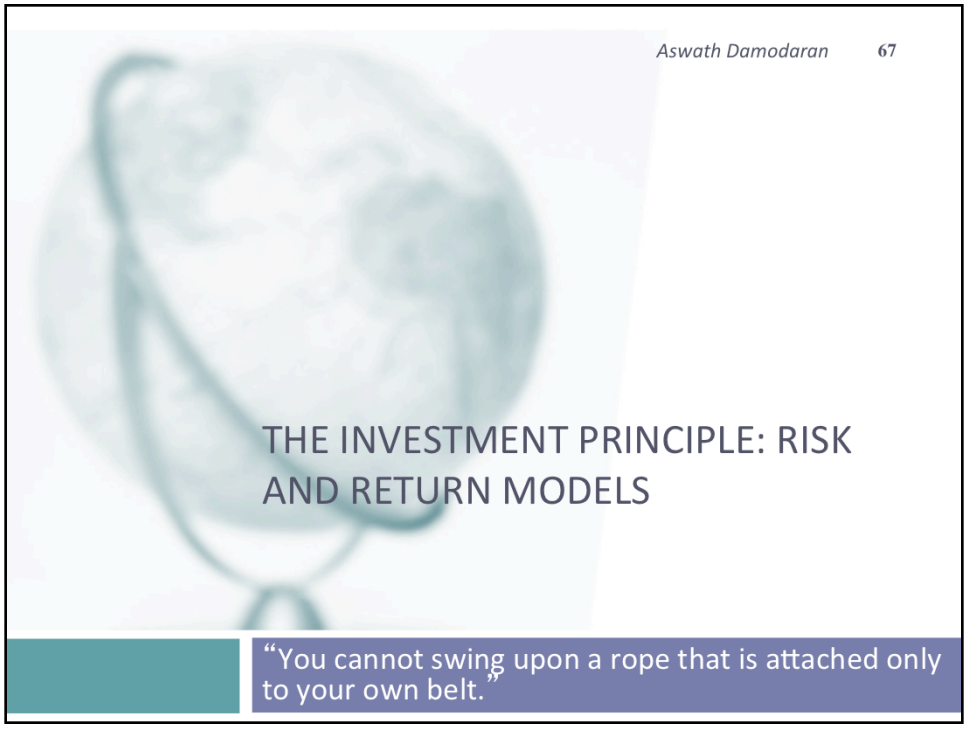
In reasonably efficient markets, where bondholders and lenders are protected, stock prices are maximized where firm value is maximized. Thus, these objective functions become equivalent.



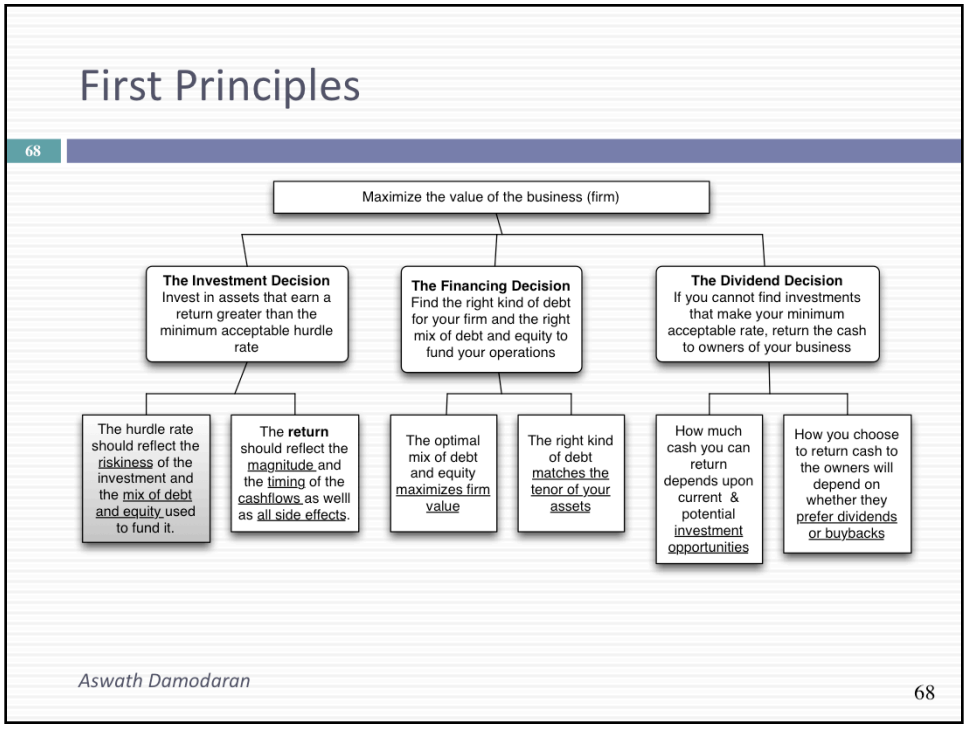
These are the guiding objectives that we will use. For the publicly traded firms in our analysis, we will view maximizing stock prices as our objective function (but in the context of efficient markets and protected lenders). For the private firm, we will focus on maximizing stockholder wealth.

My bottom line. Companies should focus on **making decisions that increase long term value** but remain cognizant of what the market thinks (and the market price). They should consider market reactions to their actions and consider the possibility that the market is right (and that they are wrong). If they believe that the market reaction is wrong and that it is based upon incomplete or erroneous information, they should try to set the record straight.

As for social obligations, companies have to recognize that it is in their best long term interests to not violate social norms (even if such violations are legal). They should be open about their social consciousness (but not holier than thou) and be willing to expend real resources (not just words) and be open about their social investments.



While the general presumption is that risk is a bad thing and some seek to avoid it at any cost, the reality is that businesses will not only always be exposed to risk but success may sometimes ride on seeking out and taking specific risks.



The focus of the first part of this investment analysis section is on coming up with a minimum acceptable hurdle rate. In the process, we have to grapple with the question of what risk is and how to bring risk into the hurdle rate.

The notion of a benchmark

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- Since financial resources are finite, there is a hurdle that projects have to cross before being deemed acceptable. This hurdle should be higher for riskier projects than for safer projects.
- A simple representation of the hurdle rate is as follows:

  Hurdle rate = Riskless Rate + Risk Premium
- The two basic questions that every risk and return model in finance tries to answer are:
  - How do you measure risk?
  - How do you translate this risk measure into a risk premium?

Underlying the idea of a hurdle rate is the notion that projects have to earn a benchmark rate of return to be accepted, and that this benchmark should be higher for riskier projects than for safer ones.

What is Risk?

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

危机

- 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.
- Risk is therefore neither good nor bad. It is just a fact of life. The question that businesses have to address is therefore not whether to avoid risk but how best to incorporate it into their decision making.

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Note that risk is neither good nor bad. It is a combination of danger and opportunity - you cannot have one without the other. Consequently, risk is neither something to be avoided nor sought out but carefully balanced. Good business avoid some risks, let others pass through to their investors and actively seek out still others.

When businesses want opportunity (higher returns), they have to live with the higher risk.

Any sales pitch that offers returns without risk is a pipe dream.

-Bob Citron, treasurer of Orange County (CA), after he lost a chunk of the county's pension fund money after investing in interest rate derivatives claimed that he was "not a finance person" and that Merrill's market strategist (Charlie Clough) had told him he could make "15% with no risk".

-Many prominent (and intelligent) people invested with Bernie Madoff because he promised them (through third parties) that he could deliver 8% more than the treasury bill rate, guaranteed. One investor, interviewed by the NY Times said, "I really did not understand what he was doing, but he said was going to do something with calls, something with puts and earn 12% every year. It sounded plausible (and all my friends were investing with him too).

A good risk and return model should…

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1. It should come up with a measure of risk that applies to all assets and not be asset-specific.
2. It should clearly delineate what types of risk are rewarded and what are not, and provide a rationale for the delineation.
3. It should come up with standardized risk measures, i.e., an investor presented with a risk measure for an individual asset should be able to draw conclusions about whether the asset is above-average or below-average risk.
4. It should translate the measure of risk into a rate of return that the investor should demand as compensation for bearing the risk.
5. It should work well not only at explaining past returns, but also in predicting future expected returns.

Before we embark on looking at risk and return models, it pays to specify what a good model will look like…

A risk measure that works only for US stocks or even for only publicly traded firms is inferior to one that applies across all stocks.

The Capital Asset Pricing Model

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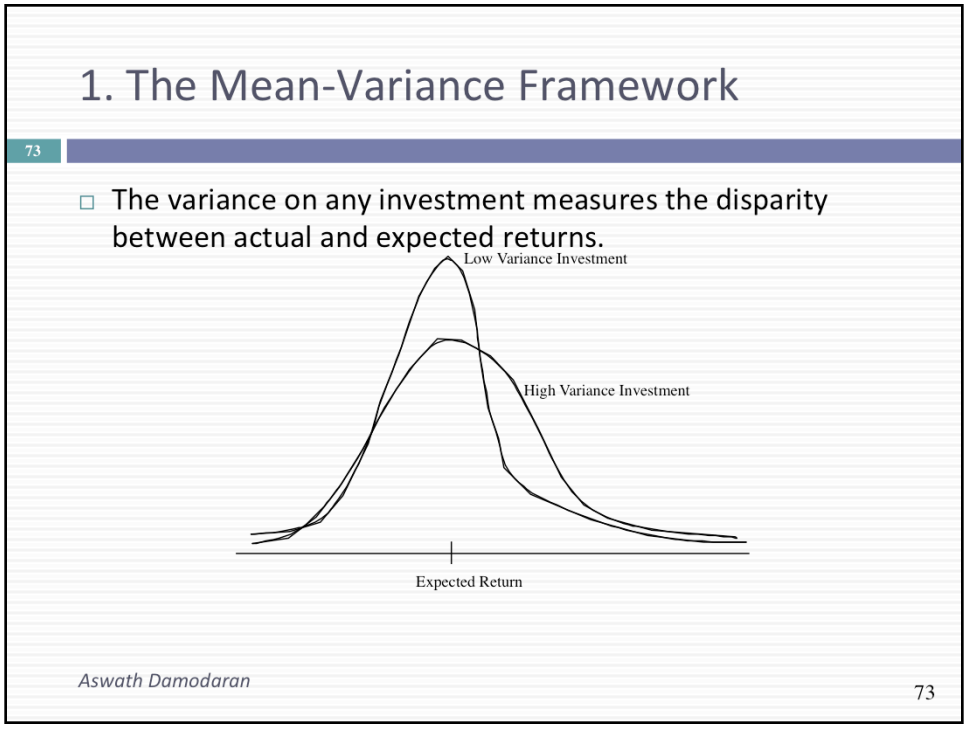
1. Uses variance of actual returns around an expected return as a measure of risk.
2. Specifies that a portion of variance can be diversified away, and that is only the non-diversifiable portion that is rewarded.
3. Measures the non-diversifiable risk with beta, which is standardized around one.
4. Translates beta into expected return -

   Expected Return = Riskfree rate + Beta * Risk Premium
5. Works as well as the next best alternative in most cases.

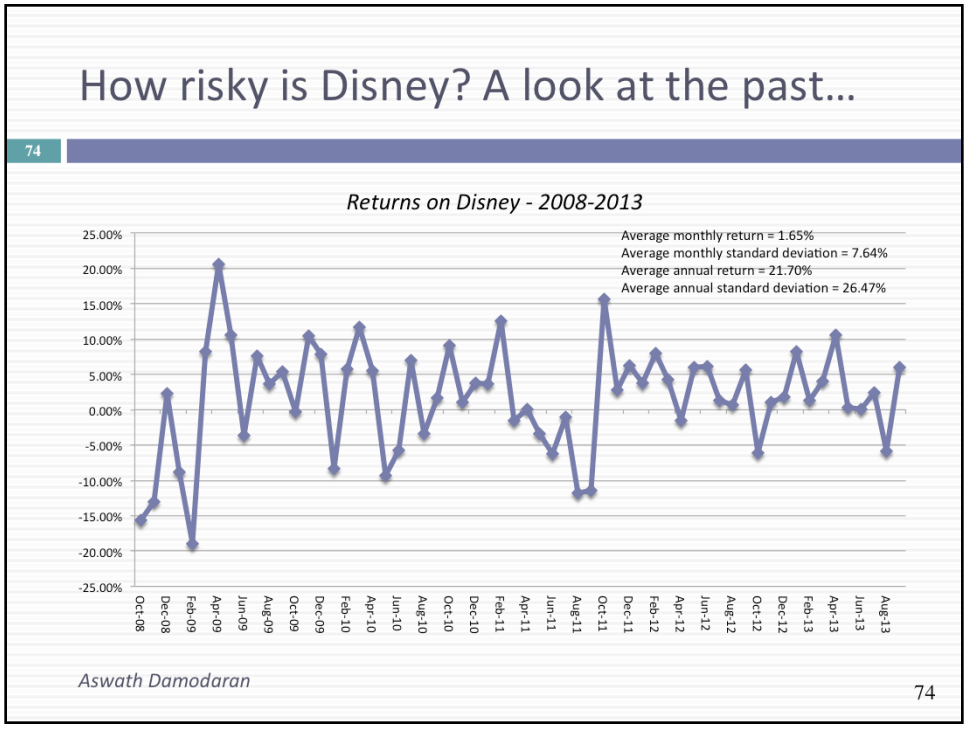
This is a summary of the CAPM, before we get into the details. This is the intuitive step-by-step process that I am going to use to bring the CAPM into being.



Note that the variance that the CAPM is built around is the variance of actual returns around an expected return.

> If you were an investor with a 1-year time horizon, and you bought a 1-year T.Bill, your actual returns (at least in nominal terms) will be equal to your expected return. It is riskfree.
>
> If you were the same investor, and you bought a stock (say Intel), your actual returns will almost certainly not be equal to your expected returns.

In practice, we often look at historical (past) returns to estimate variances. Implicitly, we are assuming that this variance is a good proxy for expected future variance.



Disney's stock price has been volatile, yielding a standard deviation of 26.47% (on an annualized basis) between 2008 and 2013. If you were an investor looking at Disney in 2014, what concerns (if any) would you have in using this as your measure of the forward looking risk in Disney stock?

1.Disney as a company changed over this period. The standard deviation from the past may not be a good indicator or future risk.

2.If historical standard deviations are your only way of estimating risk, it makes it impossible to measure risk in non-traded assets.

Do you live in a mean-variance world?

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- Assume that you had to pick between two investments. They have the same expected return of 15% and the same standard deviation of 25%; however, investment A offers a very small possibility that you could quadruple your money, while investment B's highest possible payoff is a 60% return. Would you
  a. be indifferent between the two investments, since they have the same expected return and standard deviation?
  b. prefer investment A, because of the possibility of a high payoff?
  b. prefer investment B, because it is safer?
- Would your answer change if you were not told that there is a small possibility that you could lose 100% of your money on investment A but that your worst case scenario with investment B is -50%?

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While some people may be indifferent, most pick investment A. The possibility of a high payoff, even though it is captured in the expected value, seems to tilt investors. In statistical terms, this can be viewed as evidence that investors prefer positive skewness (high positive payoffs) and value it. It is a direct contradiction to the mean-variance framework that underlies so much of conventional risk theory.

Once you add the possibility that the big positive jumps are matched by the possibility of big negative jumps, the game changes again. This propensity, called kurtosis, is not desirable to most investors.

In the real world, investments reveal far too much skewness and kurtosis than would be expected in the standard normal distribution. In fact, there are some (Mandelbrot decades ago to Taleb in the Black Swan today) who have argued that the dependence on the normal distribution is what causes risk management systems like Value at Risk (VAR) to fail.

The Importance of Diversification: Risk Types

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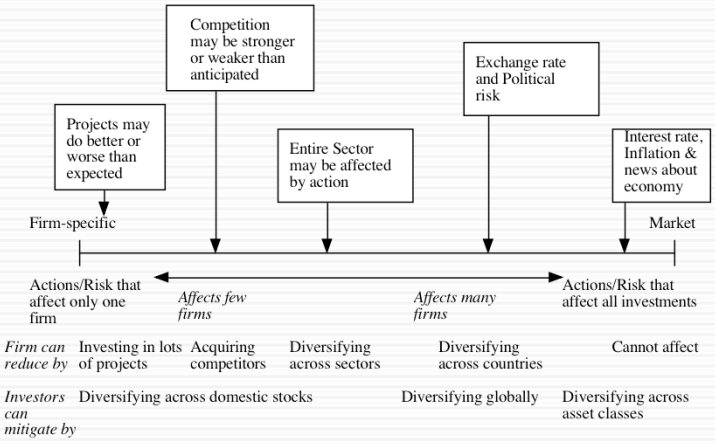
Figure 3.5: A Break Down of Risk



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This is the critical second step that all risk and return models in finance take.

As examples,

Project-specific Risk: Disney's new Hong Kong theme park: To the degree that actual revenues at this park may be greater or less than expected. (Other examples: A big budget movie, ESPN Asia…)

Competitive Risk: The competition (Universal Studios, for instance) may take actions (like opening or closing a park) that affect Disney's revenues at its theme parks.

Industry-specific risk: Congress may pass laws affecting cable and network television, and affect expected revenues at Disney and ABC, as well as all other firms in the sector, perhaps to varying degrees.

Exchange rate Risk: Disney owns NDTV, an Indian television group and has theme parks in Paris, Hong Kong and Tokyo. As the dollar strengthens or weakens, Disney will feel its effects. In fact, it may feel the effects of exchange rates even at its Orlando and Anaheim theme parks.

Market risk: If interest rates in the US go up or the economy weakens, Disney's value as a firm will be affected.

From the perspective of an investor who holds only Disney, all risk is relevant.

Why diversification reduces/eliminates firm specific risk

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- Firm-specific risk can be reduced, if not eliminated, by increasing the number of investments in your portfolio (i.e., by being diversified). Market-wide risk cannot. This can be justified on either economic or statistical grounds.
- On economic grounds, diversifying and holding a larger portfolio eliminates firm-specific risk for two reasons-
  a. Each investment is a much smaller percentage of the portfolio, muting the effect (positive or negative) on the overall portfolio.
  b. Firm-specific actions can be either positive or negative. In a large portfolio, it is argued, these effects will average out to zero. (For every firm, where something bad happens, there will be some other firm, where something good happens.)

The first argument (that each investment is a small percent of your portfolio) is a pretty weak one. The second one (that things average out over investments and time) is a much stronger one.

Consider the news stories in the WSJ on any given day. About 85% to 90% of the stories are on individual firms (rather than affecting the entire market or about macro economic occurrences) and they cut both ways - some stories are good news (with the stock price rising) and some are bad news (with stock prices falling)

The Role of the Marginal Investor

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- The marginal investor in a firm is the investor who is most likely to be the buyer or seller on the next trade and to influence the stock price.
- Generally speaking, the marginal investor in a stock has to own a lot of stock and also trade that stock on a regular basis.
- Since trading is required, the largest investor may not be the marginal investor, especially if he or she is a founder/manager of the firm (Larry Ellison at Oracle, Mark Zuckerberg at Facebook)
- **In all risk and return models in finance, we assume that the marginal investor is well diversified.**

We assume that the marginal investor, who sets prices, is well diversified. (Note that we do not need to assume that all investors are diversified)

An argument for the marginally diversified investor: Assume that a diversified investor and a non-diversified investor are both looking at Disney. The latter looks at the stock and sees all risk. The former looks at it and sees only the non-diversifiable risk. If they agree on the expected earnings and cash flows, the former will be willing to pay a higher price. Thus, the latter will get driven out of the market (perhaps into mutual funds).

Identifying the Marginal Investor in your firm…

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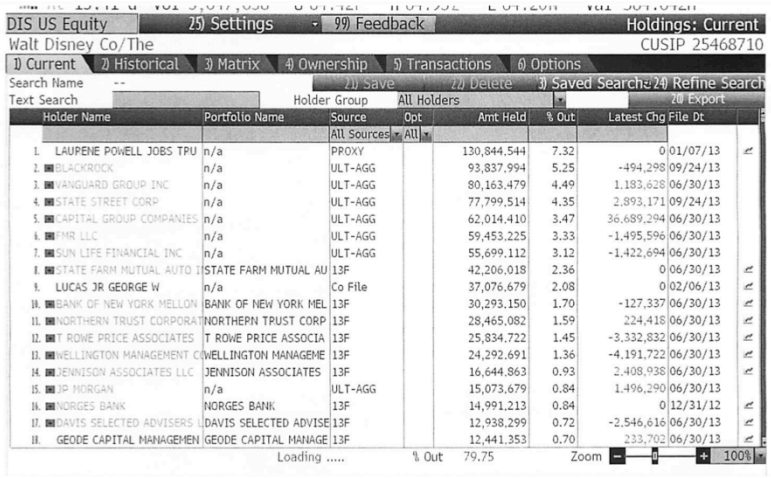
Percent of Stock held by Institutions	*Percent of Stock held by Insiders*	*Marginal Investor*
High	Low	Institutional Investor
High	High	Institutional Investor, with insider influence
Low	High (held by founder/manager of firm)	Tough to tell; Could be insiders but only if they trade. If not, it could be individual investors.
Low	High (held by wealthy individual investor)	Wealthy individual investor, fairly diversified
Low	Low	Small individual investor with restricted diversification

This is meant to be a rough guide to identifying the marginal investor. The key is to recognize that you are not identifying a particular investor but a type of investor and considering whether that investor is likely to be diversified. One useful statistic is the proportion of total trading that is done by a group. Thus, if institutional investors account for only 15% of the shares outstanding but 60% of the trading, they will have an outsized effect on the price and are thus marginal investors.

Gauging the marginal investor: Disney in 2013



DIS US Equity | 25) Settings | 99) Feedback | Holdings: Current

Walt Disney Co/The | CUSIP 25468710

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

Search Name -- | 21) Save | 22) Delete | 23) Saved Searches | 24) Refine Search

Text Search | Holder Group All Holders | 20) Export

	Holder Name	Portfolio Name	Source	Opt	Amt Held	% Out	Latest Chg	File Dt
			All Sources	All				
1.	LAURENE POWELL JOBS TPU	n/a	PROXY		130,844,544	7.32	0	01/07/13
2.	BLACKROCK	n/a	ULT-AGG		93,837,994	5.25	-494,298	09/24/13
3.	VANGUARD GROUP INC	n/a	ULT-AGG		80,163,479	4.49	1,183,628	06/30/13
4.	STATE STREET CORP	n/a	ULT-AGG		77,799,514	4.35	2,893,171	09/24/13
5.	CAPITAL GROUP COMPANIES	n/a	ULT-AGG		62,014,410	3.47	36,689,294	06/30/13
6.	FMR LLC	n/a	ULT-AGG		59,453,225	3.33	-1,495,596	06/30/13
7.	SUN LIFE FINANCIAL INC	n/a	ULT-AGG		55,699,112	3.12	-1,422,694	06/30/13
8.	STATE FARM MUTUAL AUTO I	STATE FARM MUTUAL AU	13F		42,206,018	2.36	0	06/30/13
9.	LUCAS JR GEORGE W	n/a	Co File		37,076,679	2.08	0	02/06/13
10.	BANK OF NEW YORK MELLON	BANK OF NEW YORK MEL	13F		30,293,150	1.70	-127,337	06/30/13
11.	NORTHERN TRUST CORPORAT	NORTHEPN TRUST CORP	13F		28,465,082	1.59	224,418	06/30/13
12.	T ROWE PRICE ASSOCIATES	T ROWE PRICE ASSOCIA	13F		25,834,722	1.45	-3,332,832	06/30/13
13.	WELLINGTON MANAGEMENT C	WELLINGTON MANAGEME	13F		24,292,691	1.36	-4,191,722	06/30/13
14.	JENNISON ASSOCIATES LLC	JENNISON ASSOCIATES	13F		16,644,863	0.93	2,408,938	06/30/13
15.	JP MORGAN	n/a	ULT-AGG		15,073,679	0.84	1,496,290	06/30/13
16.	NORGES BANK	NORGES BANK	13F		14,991,213	0.84	0	12/31/12
17.	DAVIS SELECTED ADVISERS L	DAVIS SELECTED ADVISE	13F		12,938,299	0.72	-2,546,616	06/30/13
18.	GEODE CAPITAL MANAGEMEN	GEODE CAPITAL MANAGE	13F		12,441,353	0.70	233,702	06/30/13

Loading ..... | % Out 79.75 | Zoom 100%

Of Disney's top 17 investors, only 2 are individuals…. Laurene Jobs and George Lucas are big stockholders (getting those shares when their companies were sold to Disney) but neither is an active trader.

Extending the assessment of the investor base

- In all five of the publicly traded companies that we are looking at, institutions are big holders of the company's stock.

	Disney	*Deutsche Bank*	*Vale (preferred)*	*Tata Motors*	*Baidu (Class A)*
Institutions	70.2%	40.9%	71.2%	44%	70%
Individuals	21.3%	58.9%	27.8%	25%	20%
Insiders	7.5%	0.2%	1.0%	31%*	10%

Company	*Largest holder*	*Number of institutional investors in top ten holdings*
Disney	Laurene Jobs (7.3%)	8
Deutsche Bank	Blackrock (4.69%)	10
Vale Preferred	Aberdeen (7.40%)	8
Tata Motors	Tata Sons (26.07%)	7
Baidu (Class A)	Capital Group (12.46%)	10

It may also make sense to look at the proportion of trading at these companies that comes from institutions. Thus, if institutions own 20% of the shares but account for 80% of the trading, they may still be the marginal investors in the company.

The Limiting Case: The Market Portfolio

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- The big assumptions & the follow up: Assuming diversification costs nothing (in terms of transactions costs), and that all assets can be traded, the limit of diversification is to hold a portfolio of every single asset in the economy (in proportion to market value). This portfolio is called the market portfolio.
- The consequence: Individual investors will adjust for risk, by adjusting their allocations to this market portfolio and a riskless asset (such as a T-Bill):

Preferred risk level	*Allocation decision*
No risk	100% in T-Bills
Some risk	50% in T-Bills; 50% in Market Portfolio;
A little more risk	25% in T-Bills; 75% in Market Portfolio
Even more risk	100% in Market Portfolio
A risk hog..	Borrow money; Invest in market portfolio

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There are two reasons investors choose to stay undiversified:

They think that they can pick undervalued investments (private information)

There are transactions costs. Since the marginal benefits of diversification decrease as the number of investments increases, you will stop diversifying.

If we assume no costs to diversifying and no private information, we take away these reasons fro not diversifying. Consequently, you will keep adding traded assets to your portfolio until you have every single one. This portfolio is called the market portfolio. This portfolio should include all traded assets, held in proportion to their market value.

The only differences between investors then will be in not what is in the market portfolio but how much they allocate to the riskless asset and how much to the market portfolio.

The Risk of an Individual Asset

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- The essence: The risk of any asset is the risk that it adds to the market portfolio Statistically, this risk can be measured by how much an asset moves with the market (called the covariance)
- The measure: Beta is a standardized measure of this covariance, obtained by dividing the covariance of any asset with the market by the variance of the market. It is a measure of the non-diversifiable risk for any asset can be measured by the covariance of its returns with returns on a market index, which is defined to be the asset's beta.
- The result: The required return on an investment will be a linear function of its beta:
  - Expected Return = Riskfree Rate+ Beta * (Expected Return on the Market Portfolio - Riskfree Rate)

If an investor holds the market portfolio, the risk of any asset is the risk that it adds to the portfolio. That is what beta measures.

The cost of equity is a linear function of the beta of the portfolio.

Limitations of the CAPM

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

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The first two critiques can be lowered against any model in finance.

The last critique is the most damaging. Fama and French (1991) noted that

> Betas explained little of the difference in returns across stocks between 1962 and 1991. (Over long time periods, it should, if the CAPM is right and betas are correctly estimated), explain almost all of the difference)
>
> Market Capitalization and price to book value ratios explained a significant portion of the differences in returns.
>
> This test, however, is a test of which model explains past returns best, and might not necessarily be a good indication of which one is the best model for predicting expected returns in the future.

Alternatives to the CAPM

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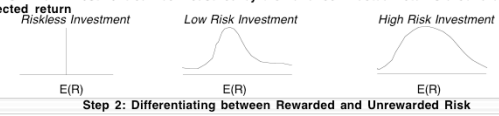
Step 1: Defining Risk

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 thismarket portfolio **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)

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Note that all of the models of risk and return in finance agree on the first two steps. They deviate at the last step in the way they measure market risk, with

The CAPM, capturing all of it in one beta, relative to the market portfolio

The APM, capturing the market risk in multiple betas against unspecified economic factors

The Multi-Factor model, capturing the market risk in multiple betas against specified macro economic factors

The Regression model, capturing the market risk in proxies such as market capitalization and price/book ratios

Why the CAPM persists…

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

It takes a model to beat a model… The CAPM may not be a very good model at predicting expected returns but the alternative models don't do much better. In fact, the tests of the CAPM are joint tests of both the effectiveness of the model and the quality of the parameters used in the testing (betas, for instance). We will argue that better beta estimates and a more careful use of the CAPM can yield far better estimates of expected return than switching to a different model.

Just as a side note, there are many who either dislike or distrust the CAPM. While we share some of their skepticism about its precision, we would not throw the basic principle that the discount rate has to be adjusted for risk out, just because we do not like the CAPM. In other words, find a different risk and return model, if so inclined, but adjust for risk.

Application Test: Who is the marginal investor in your firm?

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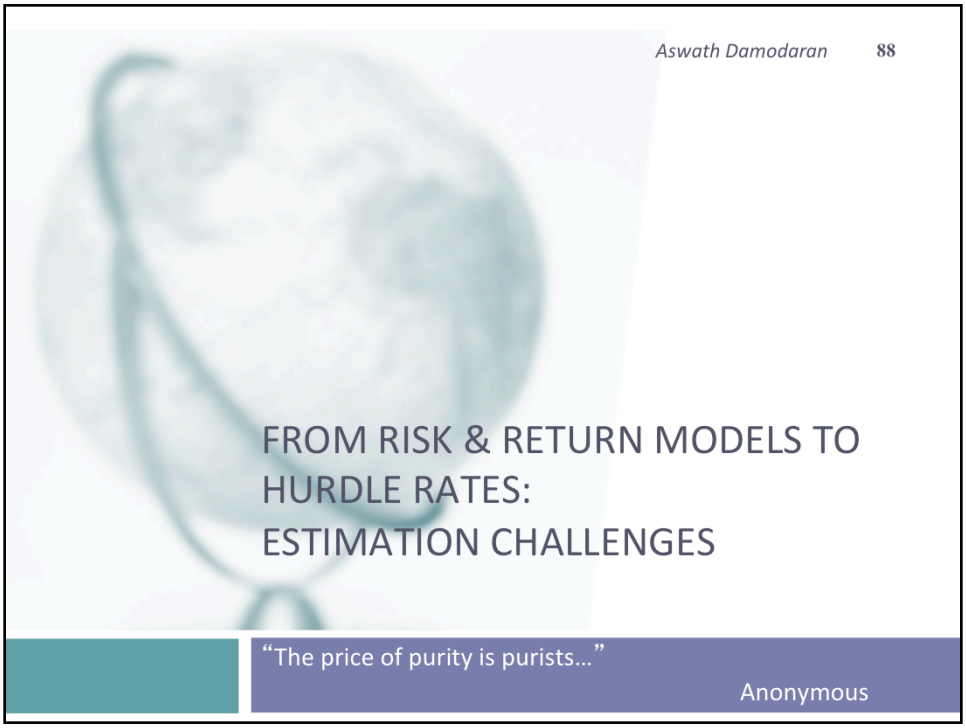
- You can get information on insider and institutional holdings in your firm from:
  - http://finance.yahoo.com/
  - Enter your company's symbol and choose profile.
- Looking at the breakdown of stockholders in your firm, consider whether the marginal investor is
  - An institutional investor
  - An individual investor
  - An insider

For most publicly traded US firms, most, if not all, of the 15 largest investors are institutional investors. In addition, high proportions of both the stock owned and traded are by institutional investors. Thus, the assumption that the marginal investor is well diversified is quite justifiable.

For very small firms, the marginal investor may be an individual investor or even a day trader, who is not diversified. What implications does this have for the use of risk and return models?



As we struggle to take the theory and models of risk and return and try to use them to estimate discount rates, we will be faced with the fact that the real world is a messy place and that data is not always clear and clean. We have to be pragmatic and make compromises along the way to get to usable discount rates.

Inputs required to use the CAPM -

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- 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, i.e. the market portfolio, over the riskless asset.
  c. The beta of the asset being analyzed.

Summarizes the inputs. Note that we are replacing the last component (E(Rm)-Rf) with the expected equity risk premium..

The Riskfree Rate and Time Horizon

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- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, i.e., to have an actual return be equal to the expected return, two conditions have to be met –
  - There has to be no default risk, which generally implies that the security has to be issued by the government. Note, however, that not all governments can be viewed as default free.
  - There can be no uncertainty about reinvestment rates, which implies that it is a zero coupon security with the same maturity as the cash flow being analyzed.

Reemphasize that you need to know the expected returns with certainty for something to be riskless.

No default risk and no reinvestment risk. Most people understand the first point, but don't get the second.

If you need an investment where you will know the expected returns with certainty over a 5-year time horizon, what would that investment be?

A T.Bill would not work - there is reinvestment risk.

Even a 5-year T.Bond would not work, because the coupons will cause the actual return to deviate from the expected return.

Thus, you need a 5-year zero coupon T.Bond

Riskfree Rate in Practice

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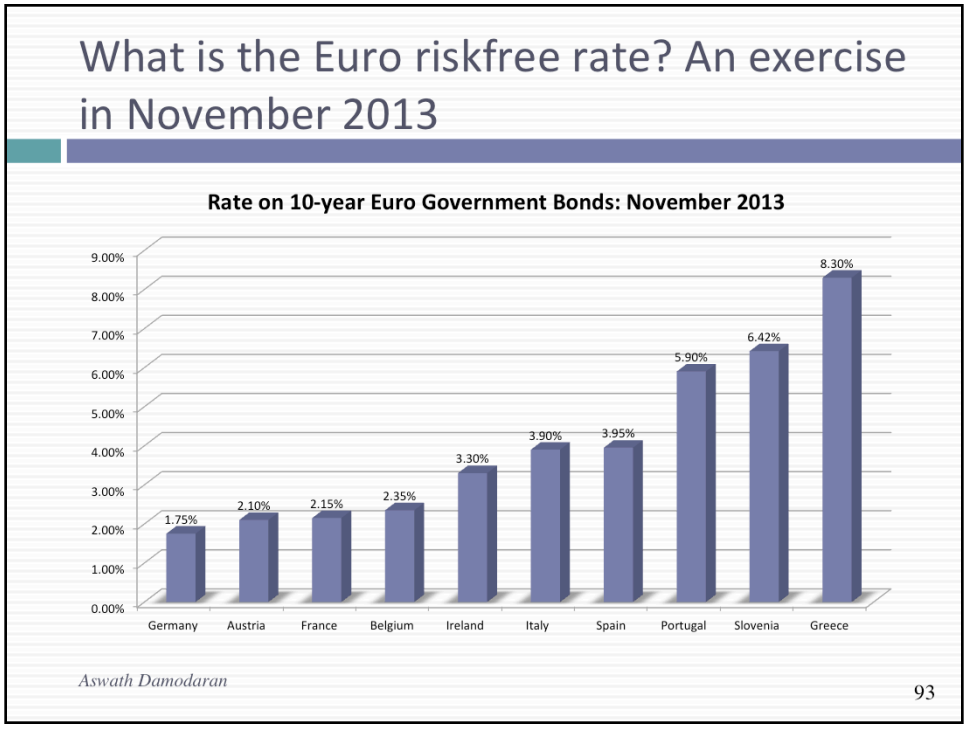
- The riskfree rate is the rate on a zero coupon government bond matching the time horizon of the cash flow being analyzed.
- Theoretically, this translates into using different riskfree rates for each cash flow - the 1 year zero coupon rate for the cash flow in year 1, the 2-year zero coupon rate for the cash flow in year 2 ...
- Practically speaking, if there is substantial uncertainty about expected cash flows, the present value effect of using time varying riskfree rates is small enough that it may not be worth it.

From a present value standpoint, using different riskfree rates for each cash flow may be overkill, except in those cases where your interest rates are very different for different time horizons (a very upward sloping or downward sloping yield curve)

The Bottom Line on Riskfree Rates

- Using a long term government rate (even on a coupon bond) as the riskfree rate on all of the cash flows in a long term analysis will yield a close approximation of the true value. For short term analysis, it is entirely appropriate to use a short term government security rate as the riskfree rate.
- The riskfree rate that you use in an analysis should be in the same currency that your cashflows are estimated in.
  - In other words, if your cashflows are in U.S. dollars, your riskfree rate has to be in U.S. dollars as well.
  - If your cash flows are in Euros, your riskfree rate should be a Euro riskfree rate.
- The conventional practice of estimating riskfree rates is to use the government bond rate, with the government being the one that is in control of issuing that currency. **In 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.

Since corporate finance generally looks at long term decisions, we will for the most part use the long term risk free rate.

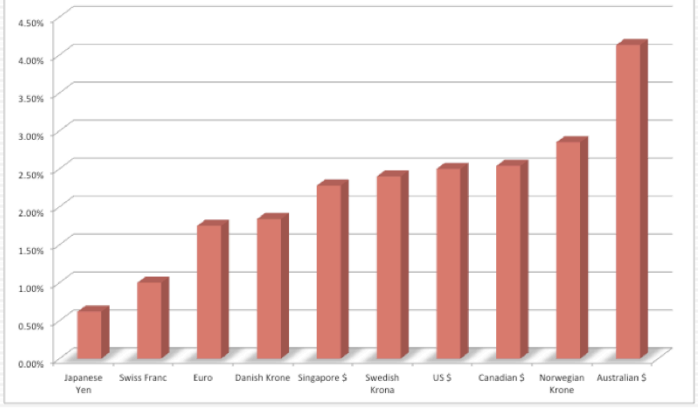


Note that there are ten government that issue bonds denominated in Euros… with different rates on each of them. Since they are all in the same currency, the differences have to be attributed to perceptions of default risk. For a riskfree rate in Euros, I would go with the lowest of the rates in this table, which belongs to the German Euro bond; the ten-year rate is 1.75%.

A purist can argue that even the German Euro bond has some default risk embedded in it. The Euro riskfree rate would therefore have to be lower than 1.75%.

When the government is default free: Risk free rates – in November 2013

Figure 4.1: Risk free Rates in Major Currencies - November 2013
Government Bond rates, with Aaa rated Governments



These are currencies where there is <u>at least one government issuing bonds in that currency that has a Aaa rating</u>. Note, though, that the fact that a ratings agency claims that a rating is Aaa does not necessarily mean that the government is default free.

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

- Adjust the local currency government borrowing rate for default risk to get a riskless local currency rate.
  - In November 2013, the Indian government rupee bond rate was 8.82%. the local currency rating from Moody's was Baa3 and the default spread for a Baa3 rated country bond was 2.25%.

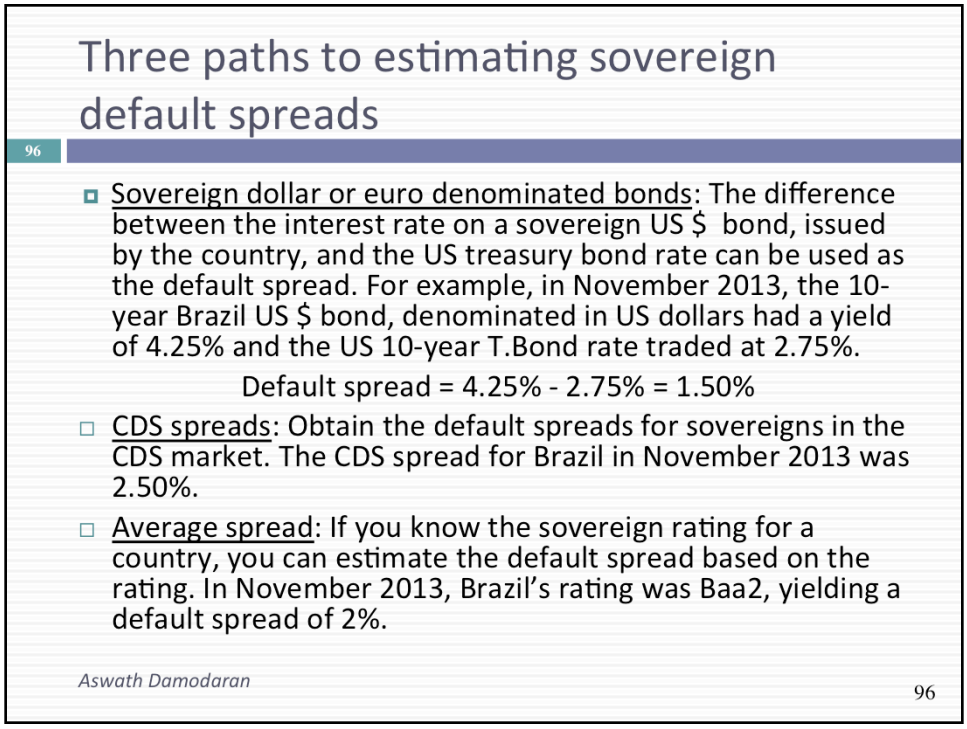
  Riskfree rate in Rupees = 8.82% - 2.25% = 6.57%
  - In November 2013, the Chinese Yuan government bond rate was 4.30% and the local currency rating was Aa3, with a default spread of 0.8%.

  Riskfree rate in Chinese Yuan = 4.30% - 0.8% = 3.5%
- 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.

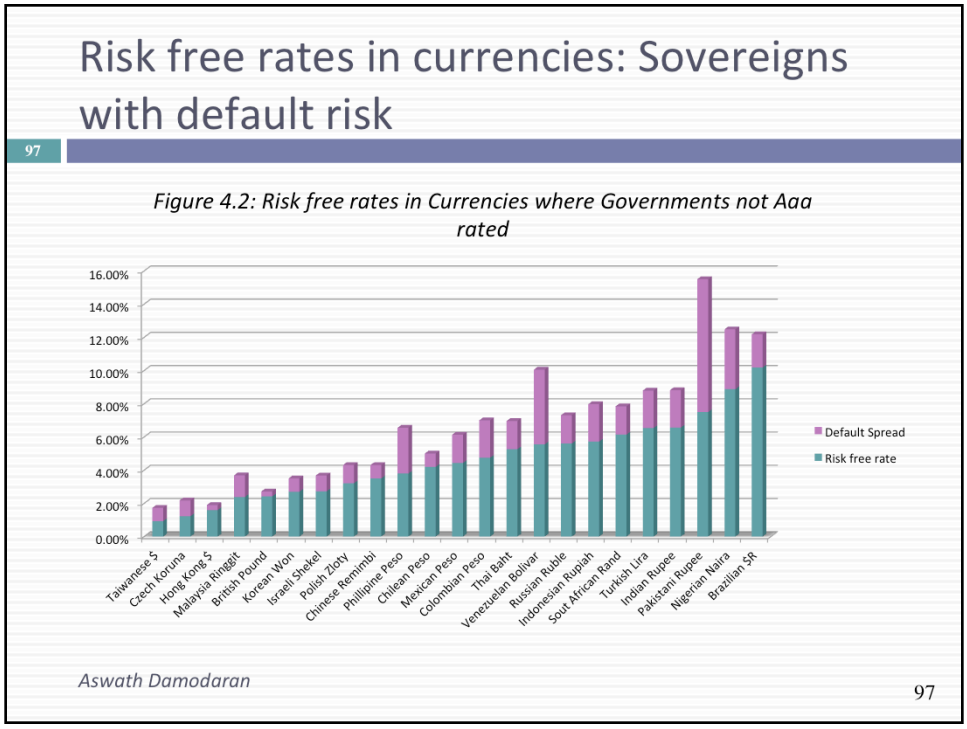
When you cannot find a default free entity in the local currency, you can start with a long-term government bond rate and net out a default spread from that rate. That default spread can be estimated using the local currency sovereign rating for the country or even a sovereign CDS spread. While this will give you a lower rate as your risk free rate, the default spread you net out will revisit your expected return computation in your equity risk premium. In fact, if you use the local government bond rate as risk free and add a country risk premium to your equity risk premium, you will be double counting country risk.

If you cannot find a local currency long-term government bond, you can either switch currencies and work with one (US dollar, Euro) where getting a risk free rate is easier. If you do so, you have to convert your local currency cash flows into US dollar or Euro cash flows, using expected exchange rates. You can also construct a synthetic risk free rate by adding the expected inflation rate to an expected real interest rate.

To do your analysis in real terms, you need a real riskfree rate. In the U.S., you can obtain such a rate by looking at the inflation indexed treasury bond rate. Outside the U.S., you can assume as a rough approximation that the real riskfree rate is equal to your real growth rate. IIf the real growth rate is much



The default spread is a key input into estimating a risk free rate in a currency where the government has default risk. All three of these approaches yield dollar-based measure of default risk.



Netting out the default spread from the government bond yields very different risk free rates for different currencies. The differences, though, are a result of different expected inflation rates in the currencies. As a consequence, there is no benefit to a company from switching currencies to compute hurdle rates. Using a lower inflation currency will result in a lower discount rate but the expected cash flows that you discount will have to be in the same currency and reflect the same lower inflation.

Measurement of the risk premium

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

Implicit here are two questions - Which investor's risk premium? What is the average risk investment?

With this assumption it is quite clear that estimating equity risk premiums will be difficult to do because different investors have different degrees of risk aversion (and will demand different premiums) and risk aversion will change over time.

Studies show that there is a genetic component to risk aversion (some people are born more risk averse than others) and that there is an environmental component. Individuals who experience a severe recession when they are in their twenties are more risk averse for the rest of their lives.

What is your risk premium?

- Assume that stocks are the only risky assets and that you are offered two investment options:
  - a riskless investment (say a Government Security), on which you can make 3%
  - a mutual fund of all stocks, on which the returns are uncertain
- How much of an expected return would you demand to shift your money from the riskless asset to the mutual fund?
  a. Less than 3%
  b. Between 3% - 5%
  c. Between 5% - 7%
  d. Between 7% -9%
  e. Between 9%- 11%
  f. More than 11%

I usually find that the median number that I get in the US is 7-9%, though the distribution is pretty spread out. This translates into a risk premium of 4-6%. (I have also run a survey on my web site for three years. With more than 30,000 responses, the median risk premium is about 4-6% as well.)

If this were the entire market, the risk premium would be a weighted average of the risk premiums demanded by each and every investor.

The weights will be determined by the wealth that each investor brings to the market. Thus, Warren Buffett's risk aversion counts more towards determining the "equilibrium" premium than yours' and mine.

As investors become more risk averse, you would expect the "equilibrium" premium to increase.

Risk Aversion and Risk Premiums

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- If this were the entire market, the risk premium would be a weighted average of the risk premiums demanded by each and every investor.
- The weights will be determined by the wealth that each investor brings to the market. Thus, Warren Buffett's risk aversion counts more towards determining the "equilibrium" premium than yours' and mine.
- As investors become more risk averse, you would expect the "equilibrium" premium to increase.

The wealthier you are, the more your estimate of the risk premium will weight into the final market premium.

Risk Premiums do change..

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

Quite a few will demand a larger premium, suggesting that this is a dynamic estimate, changing from period to period. Some will settle for a smaller premium, arguing that if stocks were a bargain before the drop, they should be even more so now. The broader point is that risk premiums change over time.

You can ask the same question about how a recession or losing your job will affect your risk premium.

Estimating Risk Premiums in Practice

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

Lists the basic approaches. Not all of them are equally useful… So, let's look at each one separately.

The Survey Approach

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- Surveying all investors in a market place is impractical.
- However, you can survey a few individuals and use these results. In practice, this translates into surveys of the following:

Group Surveyed	*Survey done by*	*Estimated ERP*	*Notes*
Individual Investors	Securities Industries Association	8.3% (2004)	One year premium
Institutional Investors	Merrill Lynch	4.8% (2013)	Monrthly updates
CFOs	Campbell Harvey & Graham	4.48% (2012)	5-8% response rate
Analysts	Pablo Fernandez	5.0% (2011)	Lowest standard deviation
Academics	Pablo Fernandez	5.7% (2011)	Higher for emerging markets

- The limitations of this approach are:
  - There are no constraints on reasonability (the survey could produce negative risk premiums or risk premiums of 50%)
  - The survey results are more reflective of the past than the future.
  - They tend to be short term; even the longest surveys do not go beyond one year.

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Merrill Lynch does surveys of portfolio managers (who presumably have more wealth to invest and hence should be weighted more) asking investors what they think the market will do over the next year. They report the number but do not use it internally as a risk premium.

Morningstar does surveys of individual investors and reports absurdly high premiums. It is not clear whether these are wishes of expectations.

Campbell and Harvey have been doing surveys of CFOs for a decade and they report their results in detail every year. (The full surveys are well worth reading and are on ssrn.com)

Generally survey premiums seem to be more backward looking than forward looking. In other words, they seem to decrease in good times and jump after market crises (the key word is after… no predictive power here)

The Historical Premium Approach

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- This is the default approach used by most to arrive at the premium to use in the model
- In most cases, this approach does the following
  - Defines a time period for the estimation (1928-Present, last 50 years...)
  - Calculates average returns on a stock index during the period
  - Calculates average returns on a riskless security over the period
  - Calculates the difference between the two averages and uses it as a premium looking forward.
- The limitations of this approach are:
  - it assumes that the risk aversion of investors has not changed in a systematic way across time. (The risk aversion may change from year to year, but it reverts back to historical averages)
  - it assumes that the riskiness of the "risky" portfolio (stock index) has not changed in a systematic way across time.

This is the basic approach used by almost every large investment bank and consulting firm.

The US has the longest and richest historical data base for stocks (going back as far as the 1800s) and many historical premiums are based upon that data…

We are trusting mean reversion, i.e., that numbers revert back to historical averages over time..

B. The Historical Risk Premium
Evidence from the United States

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	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2013	7.93%	6.29%	6.02%	4.62%
Std Error	*2.19%*	*2.34%*		
1964-2013	6.18%	4.32%	4.83%	3.33%
Std Error	*2.42%*	*2.75%*		
2004-2013	7.55%	4.41%	5.80%	3.07%
Std Error	*6.02%*	*8.66%*		

What is the right premium?

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

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

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

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The US has the longest and richest historical data base for stocks (going back as far as the 1800s) and many historical premiums are based upon that data…

We are trusting mean reversion, i.e., that numbers revert back to historical averages over time..

This is based upon historical data available on the Federal Reserve site in St. Louis. There are three reasons for why the premium estimated may differ:

1. How far back you go (My personal bias is to go back as far as possible. Stock prices are so noisy that you need very long time periods to get reasonable estimates)

2. Whether you use T.Bill or T.Bond rates (You have to be consistent. Since I will be using the T.Bond rate as my riskfree rate, I will use the premium over that rate)

3. Whether you use arithmetic or geometric means (If returns were uncorrelated over time, and you were asked to estimate a 1-year premium, the arithmetic mean would be used. Since returns are negatively correlated over time, and we are estimating premiums over longer holding periods, it makes more sense to use the compounded return, which gives us the geometric average)

Thus, I should be using the updated geometric average for stocks over bonds.

What about historical premiums for other markets?

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- Historical data for markets outside the United States is available for much shorter time periods. The problem is even greater in emerging markets.
- The historical premiums that emerge from this data reflects this data problem and there is much greater error associated with the estimates of the premiums.

Increasingly, the challenges we face are in estimating risk premiums outside the United States, not only because so many companies that we value are in younger, emerging markets but because so many US companies are looking at expanding into these markets.

One solution: Bond default spreads as CRP – November 2013

- In November 2013, the historical risk premium for the US was 4.20% (geometric average, stocks over T.Bonds, 1928-2012)

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2012	7.65%	5.88%	5.74%	4.20%
	2.20%	2.33%		

- Using the default spread on the sovereign bond or based upon the sovereign rating and adding that spread to the mature market premium (4.20% for the US) gives you a total ERP for a country.

Country	Rating	Default Spread (Country Risk Premium)	US ERP	Total ERP for country
India	Baa3	2.25%	4.20%	6.45%
China	Aa3	0.80%	4.20%	5.00%
Brazil	Baa2	2.00%	4.20%	6.20%

- If you prefer CDS spreads:

Country	*Sovereign CDS Spread*	*US ERP*	*Total ERP for country*
India	4.20%	4.20%	8.40%
China	1.20%	4.20%	5.40%
Brazil	2.59%	4.20%	6.79%

This approach is simple but it assumes that country default spreads are also good measures of additional country equity risk. The question thought is whether equities (which are riskier than bonds) should command a larger risk premium.

Beyond the default spread? Equities are riskier than bonds

- While default risk spreads and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads. One approach to scaling up the premium is to look at the relative volatility of equities to bonds and to scale up the default spread to reflect this:

$$\text{Country Risk Premium} = \text{Country Default Spread} * \left(\frac{\sigma_{\text{Equity}}}{\sigma_{\text{Country Bond}}}\right)$$

- Brazil: The annualized standard deviation in the Brazilian equity index over the previous year is 21 percent, whereas the annualized standard deviation in the Brazilian C-bond is 14 percent.

$$\text{Brazil's Total Risk Premium} = 4.20\% + 2.00\%\left(\frac{21\%}{14\%}\right) = 7.20\%$$

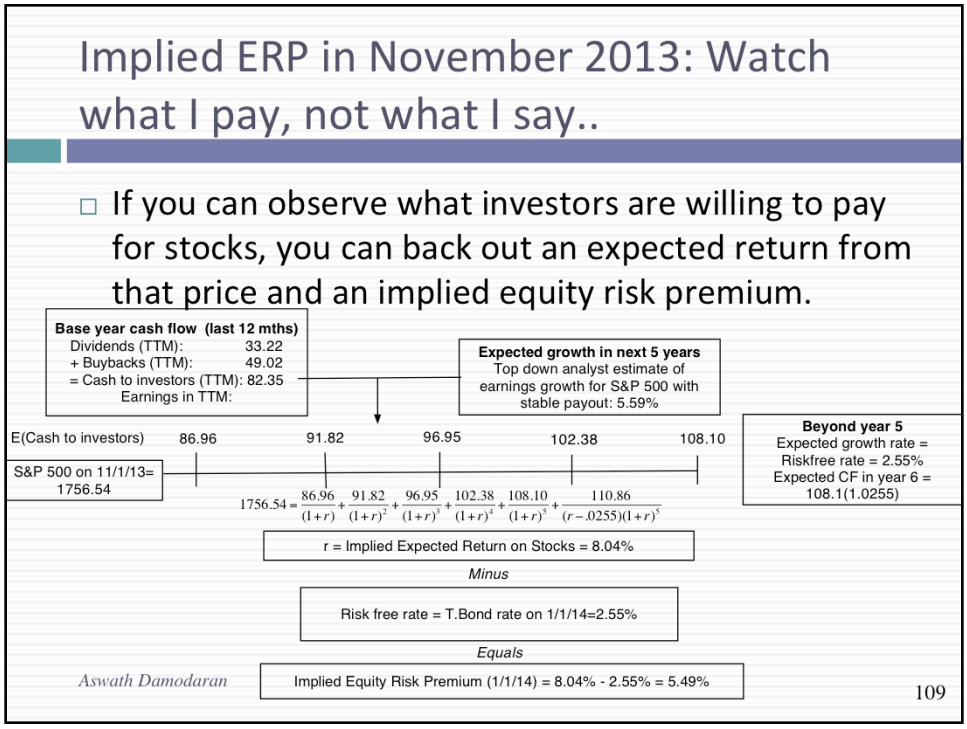
- Using the same approach for China and India:

$$\text{Equity Risk Premium}_{\text{India}} = 4.20\% + 2.25\%\left(\frac{24\%}{17\%}\right) = 7.80\%$$

$$\text{Equity Risk Premium}_{\text{China}} = 4.20\% + 0.80\%\left(\frac{18\%}{10\%}\right) = 5.64\%$$

In In this approach, we scale up the default spread to reflect the additional risk in stocks… This will result in larger equity risk premiums. We are assuming that investors, when pricing equities in an emerging market, look at what they can make on government bonds issued by that market and scale up premiums for additional risk.

There is a third approach which is closely related where you look at the standard deviation of the emerging equity market, relative to the standard deviation of the U.S. equity market, and multiply by the U.S. equity risk premium. Thus, the equity risk premium for an emerging market which is twice as volatile as the the US market should have twice the equity risk premium for the US.



View stocks like you would a bond. This is the analog to computing the YTM on a bond. The expected return is the IRR that makes the present value of expected cash flows on stocks = level of the index today. This implied equity risk premium will change over time, as the index and treasury bond rates change every minute of every day and the cash flows and growth numbers also change (though they get updated less frequently).

Implicit assumptions:

1. Total cash returned by firms in base year is not skewed by the year being an exceptionally good or bad year. You can counter this by using an average cash yield from the last 5 or 10 years to compute the cash flow.
2. The cash returned will grow at the same rate as earnings on the index for the next 5 years. (Cash yield remains constant)
3. The expected growth rate in perpetuity in cash flows will converge on the risk free rate.

The bottom line on Equity Risk Premiums in November 2013

- Mature Markets: In November 2013, the number that we chose to use as the equity risk premium for all mature markets was 5.5%. This was set equal to the implied premium at that point in time and it was much higher than the historical risk premium of 4.20% prevailing then (1928-2012 period).

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2012	7.65%	5.88%	5.74%	4.20%
	2.20%	2.33%		
1962-2012	5.93%	3.91%	4.60%	2.93%
	2.38%	2.66%		
2002-2012	7.06%	3.08%	5.38%	1.71%
	5.82%	8.11%		

- For emerging markets, we will use the melded default spread approach (where default spreads are scaled up to reflect additional equity risk) to come up with the additional risk premium that we will add to the mature market premium. Thus, markets in countries with lower sovereign ratings will have higher risk premiums that 5.5%.

Emerging Market ERP = 5.5% + Country Default Spread* $\left(\frac{\sigma_{\text{Equity}}}{\sigma_{\text{Country Bond}}}\right)$

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This is a judgment call and will depend upon your point of view in November 2013. If you believe in mean reversion and that history is the best guide to the future, you have a case for using the historical risk premium (4.20%). If you believe that the world is changing, that mean reversion may not be to historic norms and that risk premiums are dynamic, you will use an implied premium (5.5%).

a.If you thought that the 2008 crisis was just a bump in the road that markets would quickly forget and move on, you would use either the historical risk premium (4.20%) or the average implied premium over time (about 4%) as your mature market premium.

b.If you thought that the crisis has fundamentally changed markets (and perceived risk in mature markets), you should use the updated number.

A Composite way of estimating ERP for countries

Step 1: Estimate an equity risk premium for a mature market. If your preference is for a forward looking, updated number, you can estimate an implied equity risk premium for the US (assuming that you buy into the contention that it is a mature market)

- My estimate: In January 2014, my estimate for the implied premium in the US was 5%. That will also be my estimate for a mature market ERP.

Step 2: Come up with a generic and measurable definition of a mature market.

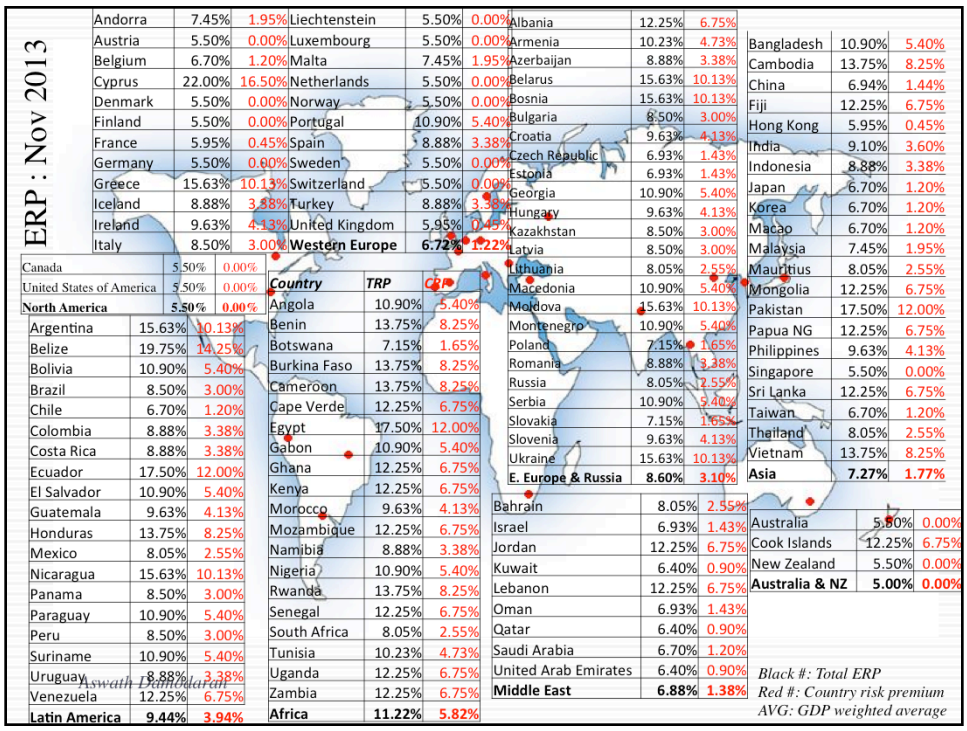
- My estimate: Any AAA rated country is mature.

Step 3: Estimate the additional risk premium that you will charge for markets that are not mature. You have two choices:

- The default spread for the country, estimated based either on sovereign ratings or the CDS market.
- A scaled up default spread, where you adjust the default spread upwards for the additional risk in equity markets.

You could compute implied equity risk premiums for all markets and dispense with this three step process, but the inputs for implied ERP can be difficult to get in many emerging markets.

You may also take issue with my definition of a mature market (AAA) and my use of default spreads as measures of country risk. I share many of your concerns about whether these are adequate measures of country risk, but until we can come up with better measures, we are stuck with these.



Country risk premiums in November 2013. I use the sovereign rating for each country to estimate a default spread based on that rating (I compute this spread by averaging out the observed spreads on all countries with a given rating, using either $ denominated bonds or the CDS as my measure of the spread) and then scale that spread up by 1.5 (reflecting the average ratio of equity market volatility to government bond market volatility in each market). The number I obtain is then added to my base mature market premium of 5.5% (computed as the updated implied equity risk premium for the S&P 500).

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%**

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The ERP for a company should reflect where it does business rather than where it is incorporation. While I have used revenues as my basis for estimating the composite premium for Disney, you may chose an alternate variable (% of production, identifiable assets) to make the allocation. If you use the country of incorporation as your only basis, you will over estimated the costs of capital for emerging market companies and under estimate them for developed market companies.

ERP for Companies: November 2013

In November 2013, the mature market premium used was 5.5%

Company	*Region/ Country*	*Weight*	*ERP*
Bookscape	United States	100%	5.50%
Vale	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%
Tata Motors	India	23.90%	9.10%
	China	23.60%	6.94%
	UK	11.90%	5.95%
	United States	10.00%	5.50%
	Mainland Europe	11.70%	6.85%
	Rest of World	18.90%	6.98%
	Company	100.00%	7.19%
Baidu	China	100%	6.94%
Deutsche Bank	Germany	35.93%	5.50%
	North America	24.72%	5.50%
	Rest of Europe	28.67%	7.02%
	Asia-Pacific	10.68%	7.27%
	South America	0.00%	9.44%
	Company	100.00%	6.12%

Bookscape and Baidu are easy, since they get all of their revenues in one market. Baidu, though, may look different in future years if its plans to expand come to fruition. Deutshe, Tata Motors and Vale are multinationals.

The Anatomy of a Crisis: Implied ERP from September 12, 2008 to January 1, 2009

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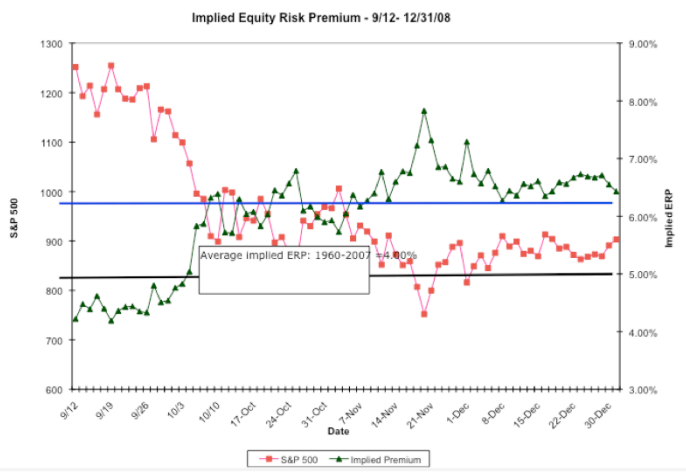

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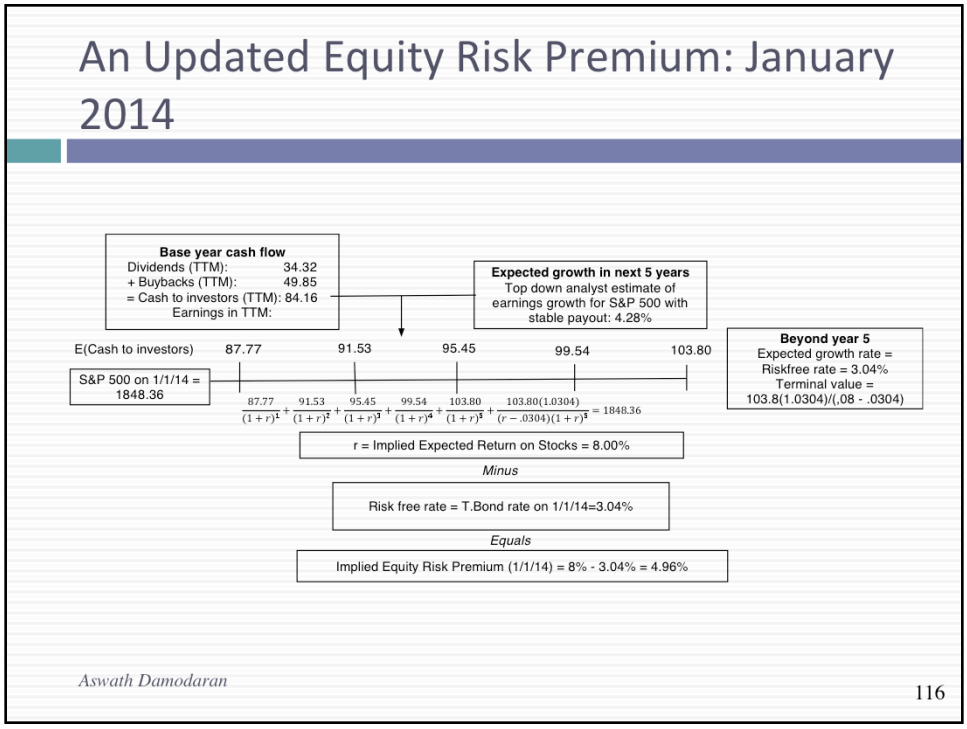
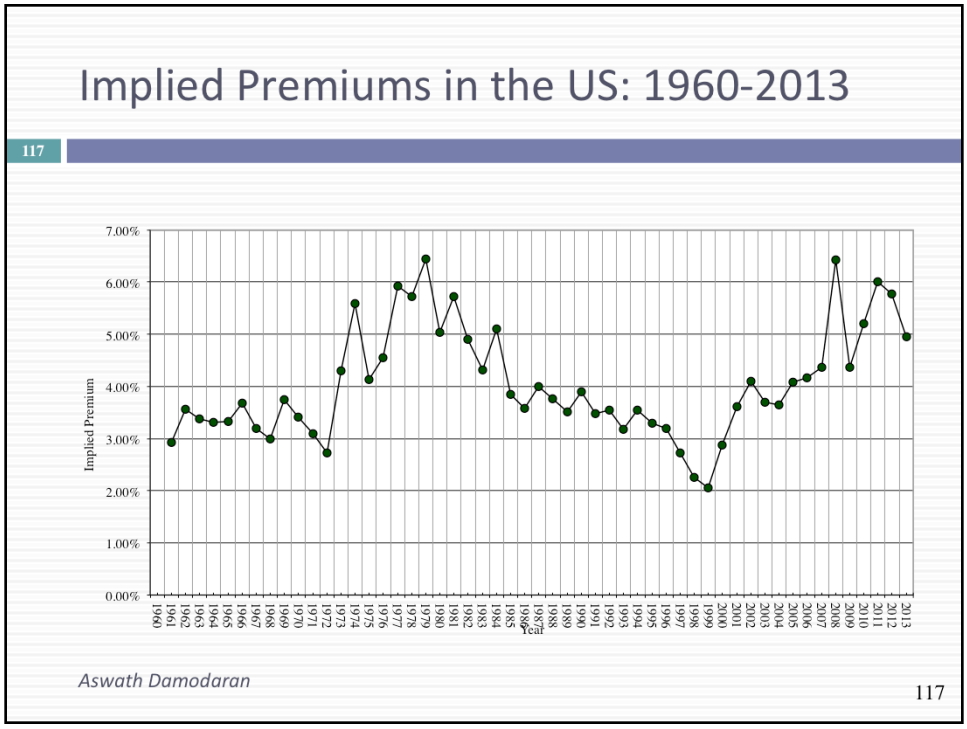
Equity risk premiums changed more in three months than they had in the previous 20 years put together. A wake-up call for those who stick with fixed premiums? That depends on whether we assume that this is an aberration or a break with the past.

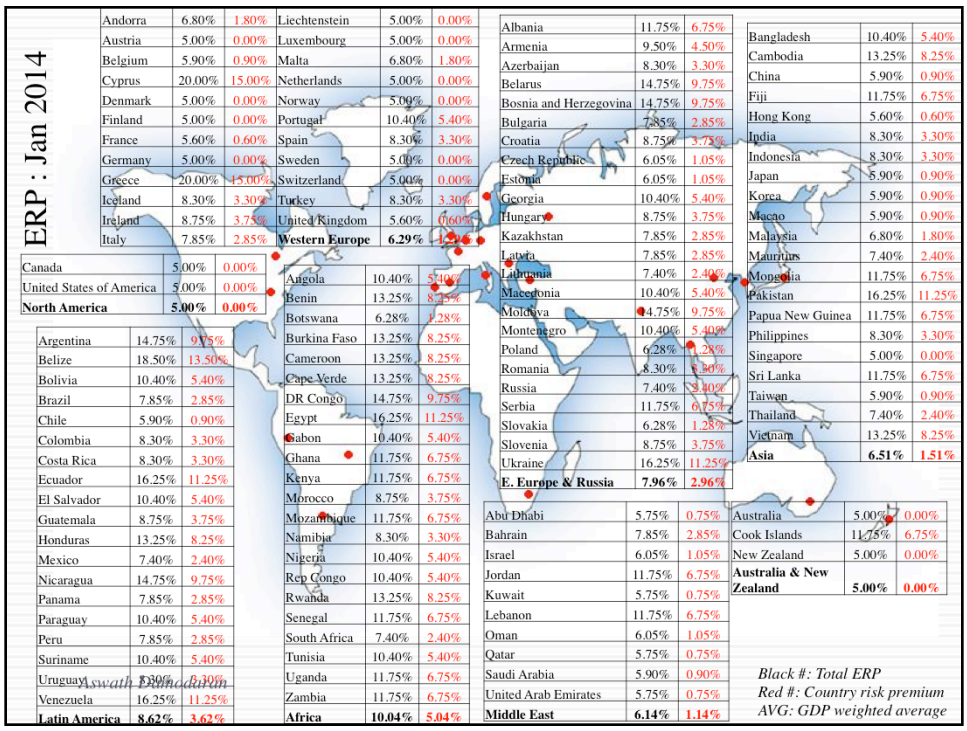


The key lesson I would take away is that equity risk premiums are unstable and that globalization has made them more unstable. The other is that there seems to be mean reversion in the process – implied premiums, when abnormally high or low, move back towards a longer term average.



As the index changes (and it is the input most likely to change by large amounts in short periods), the implied premium will change. Note that as premiums rise, stock prices drop. Notice two historical phenomena: (1) Equity risk premiums spiked in the 1970s as inflation increased in the US (2) Equity risk premiums bottomed out at 2% at the end of 1999 at the peak of the dot-com boom.

Would you settle for a 2% premium? If your answer is no, you believe that stocks are overvalued.



Updated country risk premiums. . I use the sovereign rating for each country to estimate a default spread based on that rating (I compute this spread by averaging out the observed spreads on all countries with a given rating, using either $ denominated bonds or the CDS as my measure of the spread) and then scale that spread up by 1.5 (reflecting the average ratio of equity market volatility to government bond market volatility in each market). The number I obtain is then added to my base mature market premium (computed as the updated implied equity risk premium for the S&P 500).

Update this table: This table will require updating at the start of every year. You can get the latest version of this table by going to

http://www.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls

Application Test: Estimating a Market Risk Premium

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- For your company, get the geographical breakdown of revenues in the most recent year. Based upon this revenue breakdown and the most recent country risk premiums, estimate the equity risk premium that you would use for your company.

- This computation was based entirely on revenues. With your company, what concerns would you have about your estimate being too high or too low?

Companies often break down revenues into broad regions, rather than countries. Use the regional weighted averages. Some companies do provide more information than others. Use what you can and make your best estimates.

Estimating Beta

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- The standard procedure for estimating betas is to regress stock returns (R_j) against market returns (R_m):

$$R_j = a + b\ R_m$$

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

- The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.
- The R 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. The balance (1 - R^2) can be attributed to firm specific risk.

Betas reflect not just the volatility of the underlying investment but also how it moves with the market:

Beta (Slope) = $\text{Correlation}_{jm}\ (\sigma_{\varphi}\ / s_m)$

Note that a stock can have a high standard deviation but the beta can be low, if the stock is lightly correlated with the market.

Key point: Betas may be estimated from regressions but they should never be considered purely statistical numbers. They convey economic weight - they measure the risk added on by an asset to a diversified portfolio.

Estimating Performance

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

  $R_j = R_f + b (R_m - R_f)$

  $= R_f (1-b) + b R_m$ ..... Capital Asset Pricing Model

  $R_j = a + b R_m$ ..... Regression Equation

- If

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

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

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

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

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Think of Riskfree rate (1- Beta) as the return your stock should make in a period when the market is flat (market return is zero). Note that it will be negative if the beta >1; a riskier stock will actually deliver negative returns in a month in which the market is flat.

The intercept is what your stock actually made in a month in which the market was flat.

The difference measures whether your stock under or over performed the market index over the period. It is called Jensen's alpha (Michael Jensen used the measure to evaluate mutual fund performance in 1968).

Jensen's alpha can also be computed by estimating the expected return during the period of the regression, using the actual return on the market during the period, the riskfree rate during the period and the estimated beta, and then comparing it to the actual return over the period.

Algebraically, you should get the same answer.

In some cases, the regression is run using excess returns over the risk free rate on both sides - excess return for the stock on the left hand side and excess returns for the market on the right hand side. In that case, the intercept is itself Jensen's alpha.

Setting up for the Estimation

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- Decide on an estimation period
  - Services use periods ranging from 2 to 5 years for the regression
  - Longer estimation period provides more data, but firms change.
  - Shorter periods can be affected more easily by significant firm-specific event that occurred during the period
- Decide on a return interval - daily, weekly, monthly
  - Shorter intervals yield more observations, but suffer from more noise.
  - Noise is created by stocks not trading and biases all betas towards one.
- Estimate returns (including dividends) on stock
  - Return = $(Price_{End} - Price_{Beginning} + Dividends_{Period})/ Price_{Beginning}$
  - Included dividends only in ex-dividend month
- Choose a market index, and estimate returns (inclusive of dividends) on the index for each interval for the period.

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Note the number of subjective judgments that have to be made. The estimated beta is going to be affected by all these judgments. On each one, there are trade offs to be made, which may explain why different services make different choices.

My personal biases are to

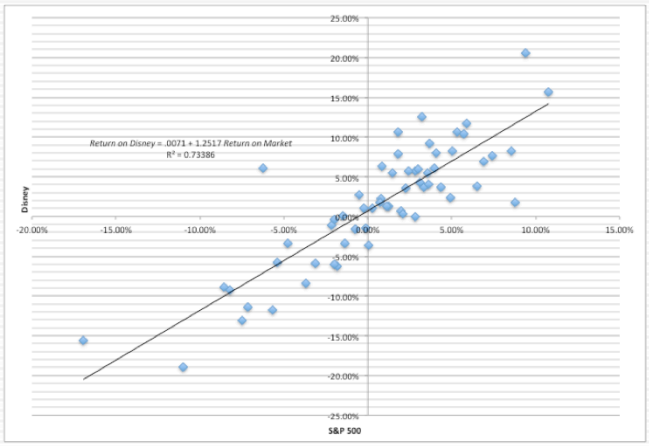
1. Use five years of data (because I use monthly data)
2. Use monthly returns (to avoid non-trading problems)
3. Use returns with dividends
4. Use an index that is broad, market weighted and with a long history (I use the S&P 500. The NYSE composite is not market weighted, and the Wilshire 5000 has both non-trading and measurement issues that have not been resolved.) You want to get as close the mythical market portfolio as you can get…

Choosing the Parameters: Disney

- Period used: 5 years
- Return Interval = Monthly
- Market Index: S&P 500 Index.
- For instance, to calculate returns on Disney in December 2009,
  - Price for Disney at end of November 2009 = $ 30.22
  - Price for Disney at end of December 2009 = $ 32.25
  - Dividends during month = $0.35 (It was an ex-dividend month)
  - Return =($32.25 - $30.22 + $ 0.35)/$30.22= 7.88%
- To estimate returns on the index in the same month
  - Index level at end of November 2009 = 1095.63
  - Index level at end of December 2009 = 1115.10
  - Dividends on index in December 2009 = 1.683
  - Return =(1115.1 – 1095.63+1.683)/ 1095.63 = 1.78%

Reports parameters used. Returns in each month include dividends, if any, in that month. For most dividend paying U.S. stocks, there will be four months in the year where there are dividends and eight months without dividends. (Will the returns in those months be better? Not if you factor in what happens to stock prices on ex dividend days)

Disney's Historical Beta



Return on Disney = .0071 + 1.2517 *Return on Market* $R^2 = 0.73386$
(0.10)

This has both the scatter plot and the regression line. Note the there is substantial error in the regression. A statistician looking at this regression would view this as evidence that it was not a good regression. A financial economist looking the same regression sees it as a reflection of the reality that most of the risk in a given investment or stock is firm-specific.

Analyzing Disney's Performance

- Intercept = 0.712%
  - This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
  - Between 2008 and 2013
    - Average Annualized T.Bill rate = 0.50%
    - Monthly Riskfree Rate = 0.5%/12 = 0.042%
    - Riskfree Rate (1-Beta) = 0.042% (1-1.252) = -.0105%
- The Comparison is then between
  - Intercept versus Riskfree Rate (1 - Beta)
  - 0.712% versus 0.0105%
  - Jensen's Alpha = 0.712% - (-0.0105)% = 0.723%
- Disney did 0.723% better than expected, per month, between October 2008 and September 2013
  - Annualized, Disney's annual excess return = $(1.00723)^{12}$ -1= 9.02%

The intercept measures what your stock actually did in a month when the market was flat (zero return) during the time period of the regression. Rf(1-beta) measures what a stock should have done (given its beta) during the same period in a month in which the market did nothing.

Disney did 9.02% better than expected on an annual basis between 2004 and 2008. The Jensen's alpha is a risk adjusted, market adjusted measure of performance. (Consider a simple example. Assume that the market was up 20% a year during the period of your regression and that you have a stock with a beta of 1.5. If you ignore the riskfree rate, this stock should have earned a return of 30% each year for the regression period. With a Jensen's alpha of 9.02%, it earned 30% + 9.02% = 39.02%.)

a. If the regression is run using excess returns on the stock and market (over an above the riskfree rate), the intercept is already Jensen's alpha:

   Return on stock - Rf = a + b (Rm - Rf)

b. An alternate approach to estimating Jensen's alpha is to use the average monthly return on the stock and subtract out the expected return using the risk free rate during the period, the beta and the average monthly return on the market. You should get an identical answer:

More on Jensen's Alpha

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- If you did this analysis on every stock listed on an exchange, what would the average Jensen's alpha be across all stocks?
  a. Depend upon whether the market went up or down during the period
  b. Should be zero
  c. Should be greater than zero, because stocks tend to go up more often than down.
- Disney has a positive Jensen's alpha of 9.02% a year between 2008 and 2013. This can be viewed as a sign that management in the firm did a good job, managing the firm during the period.
  a. True
  b. False
- Disney has had a positive Jensen's alpha between 2008 and 2013. If you were an investor in early 2014, looking at the stock, you would view this as a sign that the stock will be a:
  a. Good investment for the future
  b. Bad investment for the future
  c. No information about the future

Should be zero, if it is weighted by market value. The market cannot beat or lag itself.

What should the Jensen's alpha of an index fund be?

- Should be zero

If I claim to be a successful stock picker and run a mutual fund, what should my Jensen's alpha be?

- Should be positive for the entire portfolio (though not all stocks may have positive Jensen's alphas)

If I pick a hundred stocks at random, what should my Jensen's alpha be?

- Zero

What if I incur a 1.5% management fee and transactions costs in picking these stocks?

- Should be -1.5% (which is roughly what the Jensen's alpha is across all actively managed mutual funds)

Estimating Disney's Beta

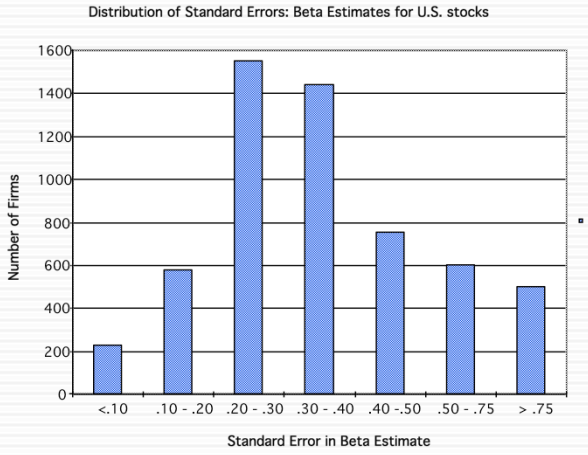
- Slope of the Regression of 1.25 is the beta
- Regression parameters are always estimated with error. The error is captured in the standard error of the beta estimate, which in the case of Disney is 0.10.
- Assume that I asked you what Disney's true beta is, after this regression.
  - What is your best point estimate?
  - What range would you give me, with 67% confidence?
  - What range would you give me, with 95% confidence?

Best point estimate: 1.25

Range with 67% confidence: 1.15-1.35

Range with 95% confidence: 1.05-1.45

The Dirty Secret of "Standard Error"



The standard errors of betas estimated in the US tend to be fairly high (the median is 0.20-0.25), with many beta estimates having standard errors of 0.40 or greater. These betas should come with warnings.

Breaking down Disney's Risk

- R Squared = 73%
- This implies that
  - 73% of the risk at Disney comes from market sources
  - 27%, therefore, comes from firm-specific sources
- The firm-specific risk is diversifiable and will not be rewarded.
- The R-squared for companies, globally, has increased significantly since 2008. Why might this be happening?
- What are the implications for investors?

This suggests that Disney is exposed to more macro risk than the typical firm in the US. The typical firm has an R squared of between 25-30%, down from 35-40% prior to 2008. Hence, the allure of diversification.

(Why might this be? Size and having a more diversified business mix may explain Disney's high R-squared.)

About 20% of firms have R-squared of less than 10%…

About 20% of firms have R-squared exceeding 50%…

If you were undiversified, which group would you like to hold? (Answer: The latter)

If you are diversified, which group would you like to hold? (Does not matter, since you get rid of the firm-specific risk anyway)

The Relevance of R Squared

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- You are a diversified investor trying to decide whether you should invest in Disney or Amgen. They both have betas of 1.25, but Disney has an R Squared of 73% while Amgen's R squared is only 25%. Which one would you invest in?
  - Amgen, because it has the lower R squared
  - Disney, because it has the higher R squared
  - You would be indifferent
- Would your answer be different if you were an undiversified investor?

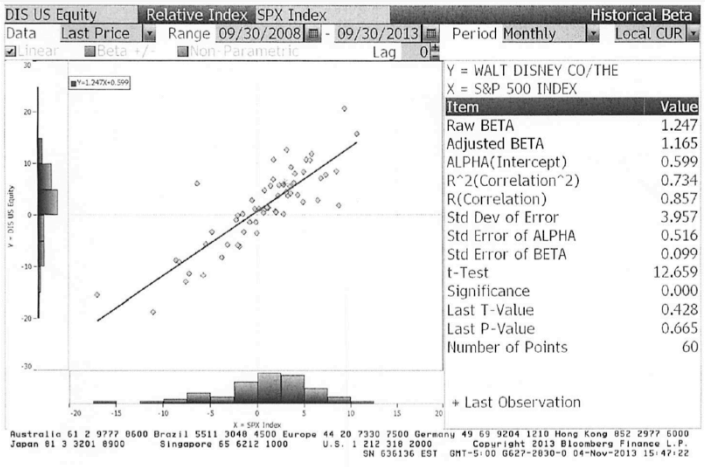
If you were a diversified investor, you would not care, since you would diversify away all of the firm specific risk anyway. After you are done diversifying, what you will be left with on both stocks is the market risk which is best measured using the betas.

If you were undiversified, you would prefer Disney, which has less firm-specific risk.

How can two companies have the same betas but different R-squared?

The R-squared measures the proportion of the risk in a stock that is market risk.. The beta measures the units of market risk (in standardized terms). Amgen, in this case, has far more total risk than Disney (approximately three times as much). Thus, 25% of Amgen's risk works out to the same number of units of market risk as 73% of Disney's risk.

Beta Estimation: Using a Service (Bloomberg)



This is the page for Disney's beta, using the same period as the regression run earlier, from Bloomberg.

Bloomberg, however, uses only price returns (it ignores dividends both in the stock and the index). Hence the intercept is different.

The adjusted beta is just the regression beta moves towards one, reflecting the empirical realities that for most firms, betas tend to drift towards one as they get larger and more diversified.

Estimating Expected Returns for Disney in November 2013

- Inputs to the expected return calculation
  - Disney's Beta = 1.25
  - Riskfree Rate = 2.75% (U.S. ten-year T.Bond rate in November 2013)
  - Risk Premium = 5.76% (Based on Disney's operating exposure)

Expected Return = Riskfree Rate + Beta (Risk Premium)

= 2.75% + 1.25 (5.76%) = 9.95%

Note that this expected return would have been different if we had decided to use a different equity risk premium. The potential error in the beta will translate into a forecast error on the expected return as well.

Use to a Potential Investor in Disney

- As a potential investor in Disney, what does this expected return of 9.95% tell you?
  - This is the return that I can expect to make in the long term on Disney, if the stock is correctly priced and the CAPM is the right model for risk,
  - This is the return that I need to make on Disney in the long term to break even on my investment in the stock
  - Both
- Assume now that you are an active investor and that your research suggests that an investment in Disney will yield 12.5% a year for the next 5 years. Based upon the expected return of 9.95%, you would
  - Buy the stock
  - Sell the stock

Both. If the stock is correctly priced, the beta is correctly estimated and the CAPM is the right model, this is what you would expect to make on Disney in the long term. As an investor, this is what you would need to make to break even on the investment. You are not being greedy, just prudent. After all, if you don't make higher returns when the market is going up, you will find yourself falling behind when the market is going down.

Buy the stock, since you think you can make more than the hurdle rate.

How managers use this expected return

- Managers at Disney
  - need to make at least 9.95% as a return for their equity investors to break even.
  - this is the hurdle rate for projects, when the investment is analyzed from an equity standpoint
- In other words, Disney's cost of equity is 9.95%.
- What is the cost of not delivering this cost of equity?

The cost of equity is what equity investors in your company view as their required return.

The cost of not delivering this return is more unhappy stockholders, a lower stock price, and if you are a manager, maybe your job.

Going back to the corporate governance section, if stockholders have little or no control over managers, managers are less likely to view this as the cost of equity.

Application Test: Analyzing the Risk Regression

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- Using your Bloomberg risk and return print out, answer the following questions:
  - How well or badly did your stock do, relative to the market, during the period of the regression?
  - Intercept - (Riskfree Rate/n) (1- Beta) = Jensen's Alpha
    - where n is the number of return periods in a year (12 if monthly; 52 if weekly)
  - What proportion of the risk in your stock is attributable to the market? What proportion is firm-specific?
  - What is the historical estimate of beta for your stock? What is the range on this estimate with 67% probability? With 95% probability?
  - Based upon this beta, what is your estimate of the required return on this stock?
  - Riskless Rate + Beta * Risk Premium

Try this on your company. It is a useful starting point to assessing your company, the equivalent of a doctor looking at the blood work of a new patient.

A Quick Test

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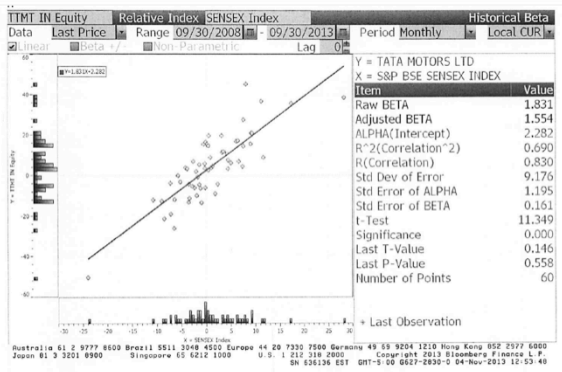
- You are advising a very risky software firm on the right cost of equity to use in project analysis. You estimate a beta of 3.0 for the firm and come up with a cost of equity of 20%. The CFO of the firm is concerned about the high cost of equity and wants to know whether there is anything he can do to lower his beta.
- How do you bring your beta down?
- Should you focus your attention on bringing your beta down?
  - Yes
  - No

There are three ways to bring down your beta.

1. Pay off debt, if you have any
2. Move into safer businesses
3. Sell off assets, and keep cash on your balance sheet

Note that each of these actions may lower the company's beta, but may not be in the company's (or its stockholders') best interests. What matters is the difference between what you make on your projects (return on equity) and your cost of equity. If you lower your cost of equity, but lower your return on equity even more, you are not serving your stockholders.

Regression Diagnostics for Tata Motors



Beta = 1.83
67% range
1.67-1.99

69% market risk
31% firm specific

Jensen's α
= 2.28% - 4%/12 (1-1.83) = 2.56%
Annualized = $(1+.0256)^{12}$-1= 35.42%
Average monthly riskfree rate (2008-13) = 4%

Expected Return (in Rupees)
= Riskfree Rate+ Beta*Risk premium
= 6.57%+ 1.83 (7.19%) = 19.73%

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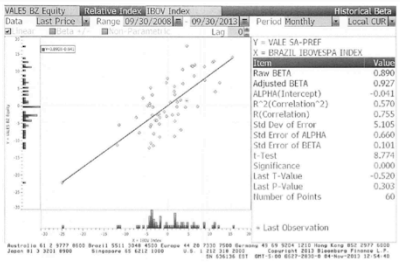
Deconstructing Tata Motor's beta page, we find that

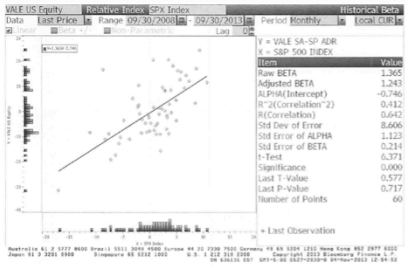
a.Tata Motors did better than expected over the period by 19.73% in an annual basis.

b.Tata Motors is above average risk (1.83 times as risky as the typical Indian firm)

c.About 69% of the risk in Tata Motors is market risk

A better beta? Vale





Shows how easy it is to get your betas to move, if you get to try different indices (and different time periods and different return intervals).

Deutsche Bank and Baidu: Index Effects on Risk Parameters

- For Deutsche Bank, a widely held European stock, we tried both the DAX (German index) and the FTSE European index.

	DAX	*FTSE Euro 100*
Intercept	-0.90%	-0.15%
Beta	1.58	1.98
Std Error of beta	0.21	0.29
R^2	51%	29%

- For Baidu, a NASDAQ listed stock, we ran regressions against both the S&P 500 and the NASDAQ.

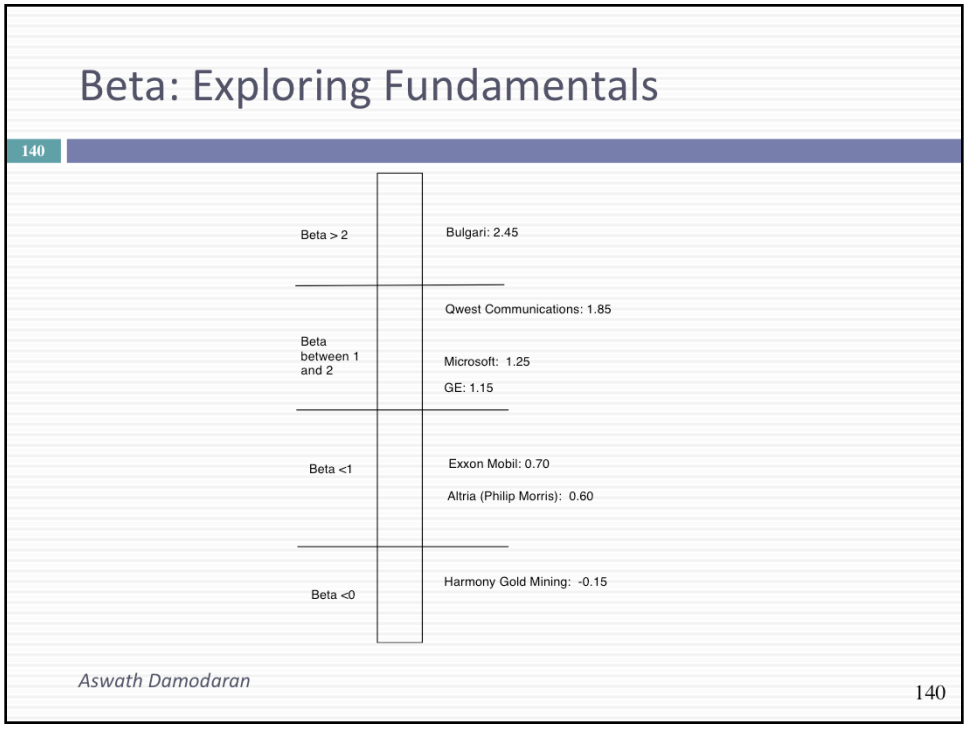
	S&P 500	*NASDAQ*
Intercept	2.84%	2.15%
Beta	1.63	1.65
Std Error of beta	0.28	0.23
R^2	37%	47%

As the index used expands and becomes broader, the R-squared drops off and the standard error increases.

Which one would you use? It depends upon who your marginal investors are. If they are investors who are local and stay focused only on the local market, you may be able to get away with the DAX regression. As your marginal investors become more diversified, you should move from the local index to wider indices. The least precise beta estimate (with the highest standard error) may be the most meaningful.

As investors become globalized, there is an argument to be made that we should be abandoning the use of local indices and replacing them with global indices.

With Baidu, the best index is not the one that fits it best (which would be the NASDAQ) but the one that best captures what marginal investors are invested in.



A cross selection of regression betas for companies… Lets try a story for each one:

Real Networks: Small, high growth company in risky business

Qwest: Some business risk but much more substantial overlay of financial risk created by borrowing billions.

Microsoft: Example of beta drift towards one as companies get larger and their product base (and customer base) becomes more diversified. Microsoft's beta in the lat 1980s was much higher than 2.

GE: Most diversified US company you will find.. Beta will drift towards one for diversified companies. GE Capital's debt acts as ballast on beta

Philip Morris: Main risk is oil price risk which cuts against the rest of the market (lower oil prices are good for many companies and the economy but not for oil companies). The litigation risk will not show up in the beta because it is firm-specific. (Changing the company name to Altria will not make a difference)

Harmony Gold Mining Company: A negative beta implies that adding this stock on to a diversified portfolio will actually reduce risk (acts as insurance). Gold has historically been an insurance against inflation.

(Consequences of a negative beta: Expected return < Riskfree rate)

Determinant 1: Product Type

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

Betas measure risk relative to the market.

Firms which are cyclical or sell discretionary products tend to do much better when the economy is doing well (and the market is doing well) and much worse when the economy is doing badly than other firms in the market.

In terms of basic economics, companies that sell products/ services that have elastic demand should have higher betas than ones that sell products/services with inelastic demand.

A Simple Test

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- Phone service is close to being non-discretionary in the United States and Western Europe. However, in much of Asia and Latin America, there are large segments of the population for which phone service is a luxury.
- Given our discussion of discretionary and non-discretionary products, which of the following conclusions would you be willing to draw:
  - Emerging market telecom companies should have higher betas than developed market telecom companies.
  - Developed market telecom companies should have higher betas than emerging market telecom companies
  - The two groups of companies should have similar betas

I would expect emerging market telecom company betas to be higher… A product or service that is more discretionary will translate into more volatile earnings and more sensitivity to overall macro economic conditions and a highr beta.

Determinant 2: Operating Leverage Effects

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

Firms with high fixed costs tend to see much bigger swings in operating income (and stock prices) for a given change in revenues than firms with more flexible cost structures.

Consider the case of the airline sector, which tends to have cost structures which are almost entirely fixed (plane lease expenses, fuel costs …). Firms in the sector have high betas.

Are you destined to have a high beta, once you pick a sector?

To an extent, yes, but you can take action or make decisions to change your destiny. Consider Southwest. By using only one type of aircraft, hedging fuel costs, flying from no-name airports and having a flexible workforce, Southwest has been able to lower its fixed costs as a proportion of total costs. (Focusing less on business travel and high priced tickets has also helped them on the discretionary component).

Measures of Operating Leverage

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- Fixed Costs Measure = Fixed Costs / Variable Costs
  - This measures the relationship between fixed and variable costs. The higher the proportion, the higher the operating leverage.
- EBIT Variability Measure = % Change in EBIT / % Change in Revenues
  - This measures how quickly the earnings before interest and taxes changes as revenue changes. The higher this number, the greater the operating leverage.

The direct measures of fixed costs and variable costs are difficult to obtain. Hence we use the second.

Disney's Operating Leverage: 1987- 2013

Year	Net Sales	% Change in Sales	EBIT	% Change in EBIT
1987	$2,877		$756	
1988	$3,438	19.50%	$848	12.17%
1989	$4,594	33.62%	$1,177	38.80%
1990	$5,844	27.21%	$1,368	16.23%
1991	$6,182	5.78%	$1,124	-17.84%
1992	$7,504	21.38%	$1,287	14.50%
1993	$8,529	13.66%	$1,560	21.21%
1994	$10,055	17.89%	$1,804	15.64%
1995	$12,112	20.46%	$2,262	25.39%
1996	$18,739	54.71%	$3,024	33.69%
1997	$22,473	19.93%	$3,945	30.46%
1998	$22,976	2.24%	$3,843	-2.59%
1999	$23,435	2.00%	$3,580	-6.84%
2000	$25,418	8.46%	$2,525	-29.47%
2001	$25,172	-0.97%	$2,832	12.16%
2002	$25,329	0.62%	$2,384	-15.82%
2003	$27,061	6.84%	$2,713	13.80%
2004	$30,752	13.64%	$4,048	49.21%
2005	$31,944	3.88%	$4,107	1.46%
2006	$33,747	5.64%	$5,355	30.39%
2007	$35,510	5.22%	$6,829	27.53%
2008	$37,843	6.57%	$7,404	8.42%
2009	$36,149	-4.48%	$5,697	-23.06%
2010	$38,063	5.29%	$6,726	18.06%
2011	$40,893	7.44%	$7,781	15.69%
2012	$42,278	3.39%	$8,863	13.91%
2013	$45,041	6.54%	$9,450	6.62%
Average: 87-13		**11.79%**		**11.91%**
Average: 96-13		**8.16%**		**10.20%**

Operating Leverage
11.91/11.79 =1.01
10.20/8.16 =1.25

Average across entertainment companies = 1.35

Given Disney's operating leverage measures (1.01 or 1.25), would you expect Disney to have a higher or a lower beta than other entertainment companies?

a. Higher
b. Lower
c. No effect

This measures Disney's operating leverage historically. You need a number of years of data before you can get reasonable estimates.

Determinant 3: Financial Leverage

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

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

where

- β_L = Levered or Equity Beta D/E = Market value Debt to equity ratio
- β_u = Unlevered or Asset Beta t = Marginal tax rate

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

a. Levered
b. Unlevered

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Same rationale as operating leverage but the focus here is on equity earnings. Put another way, a firm with stable operating income can make its equity income much more volatile by borrowing large sums of money.

The levered beta equation on this page are built on two assumptions of convenience: that the beta for debt is zero and that the tax benefit from debt reduces its impact on debt. It is easy to modify the equation to allow for changes in both assumptions.

The regression beta is a levered beta.

Effects of leverage on betas: Disney

- The regression beta for Disney is 1.25. This beta is a levered beta (because it is based on stock prices, which reflect leverage) and the leverage implicit in the beta estimate is the average market debt equity ratio during the period of the regression (2008 to 2013)
- The average debt equity ratio during this period was 19.44%.
- The unlevered beta for Disney can then be estimated (using a marginal tax rate of 36.1%)

  = Current Beta / (1 + (1 - tax rate) (Average Debt/Equity))

  = 1.25 / (1 + (1 - 0.361)(0.1944))= 1.1119

Note that betas reflect the average leverage over the period and not the current leverage of the firms. Firms whose leverage has changed over the period will have regression betas that are different from their true betas.

Disney : Beta and Financial Leverage

Debt to Capital	*Debt/Equity Ratio*	*Beta*	*Effect of Leverage*
0.00%	0.00%	1.11	0.00
10.00%	11.11%	1.1908	0.08
20.00%	25.00%	1.29	0.18
30.00%	42.86%	1.42	0.30
40.00%	66.67%	1.59	0.47
50.00%	100.00%	1.82	0.71
60.00%	150.00%	2.18	1.07
70.00%	233.33%	2.77	1.66
80.00%	400.00%	3.95	2.84
90.00%	900.00%	7.51	6.39

Since equity investors bear all of the non-diversifiable risk, the beta of Disney's equity will increase as the leverage increases.

Betas are weighted Averages

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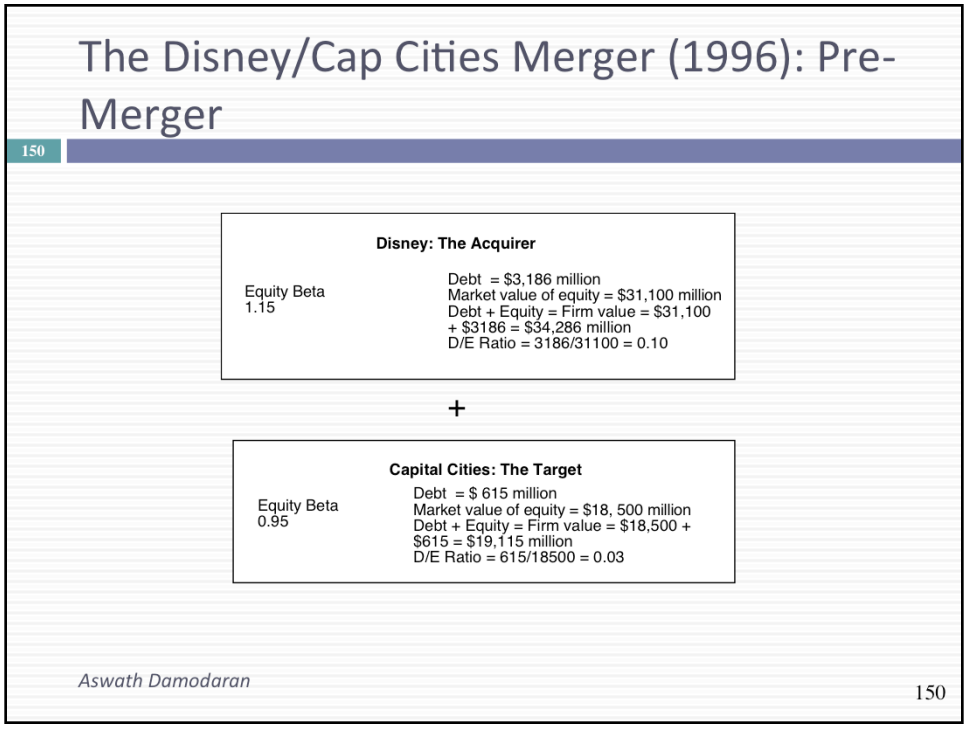
- The beta of a portfolio is always the market-value weighted average of the betas of the individual investments in that portfolio.
- Thus,
  - the beta of a mutual fund is the weighted average of the betas of the stocks and other investment in that portfolio
  - the beta of a firm after a merger is the market-value weighted average of the betas of the companies involved in the merger.

Betas are always weighted averages - where the weights are based upon market value. This is because betas measure risk relative to a market index.



These are the betas of the firms at the time of Disney's acquisition. The tax rate used for both betas is 36%.

Equity betas are levered betas and we will assume that the leverage built into them is the current debt to equity ratio for the two firms.

Disney Cap Cities Beta Estimation: Step 1

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- Calculate the unlevered betas for both firms
  - Disney's unlevered beta = 1.15/(1+0.64*0.10) = 1.08
  - Cap Cities unlevered beta = 0.95/(1+0.64*0.03) = 0.93
- Calculate the unlevered beta for the combined firm
  - Unlevered Beta for combined firm
    = 1.08 (34286/53401) + 0.93 (19115/53401)
    = 1.026
  - The weights used are the firm values (and not just the equity values) of the two firms, since these are unlevered betas and thus reflects the risks of the entire businesses and not just the equity]

The unlevered beta of the combined firm will always be the weighted average of the two firms' unlevered betas. The firm values (rather than the equity values) are used for the weights because we are looking at the unlevered betas of the firms .

(In computing the values of the two businesses, I added debt to equity. To the extent that each of these companies has large cash balance (I am assuming that they do not, you may want to net cash out of each firm's value).

Disney Cap Cities Beta Estimation: Step 2

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- If Disney had used all equity to buy Cap Cities equity, while assuming Cap Cities debt, the consolidated numbers would have looked as follows:
  - Debt = $ 3,186+ $615 = $ 3,801 million
  - Equity = $ 31,100 + $18,500 = $ 49,600 m (Disney issues $18.5 billion in equity)
  - D/E Ratio = 3,801/49600 = 7.66%
  - New Beta = 1.026 (1 + 0.64 (.0766)) = 1.08
- Since Disney borrowed $ 10 billion to buy Cap Cities/ABC, funded the rest with new equity and assumed Cap Cities debt:
  - The market value of Cap Cities equity is $18.5 billion. If $ 10 billion comes from debt, the balance ($8.5 billion) has to come from new equity.
  - Debt = $ 3,186 + $615 million + $ 10,000 = $ 13,801 million
  - Equity = $ 31,100 + $8,500 = $39,600 million
  - D/E Ratio = 13,801/39600 = 34.82%
  - New Beta = 1.026 (1 + 0.64 (.3482)) = 1.25

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This reflects the effects of the financing of the acquisition. In the second scenario, note that $ 10 billion of the $ 18.5 billion is borrowed. The remaining $ 8.5 billion has to come from new equity issues.

Exercise: What would Disney's beta be if it had borrowed the entire $ 18.5 billion?

- Debt = $ 615 + $ 3,186 + $ 18,500 = $ 22,301 million
- Equity = $ 31,100 million
- D/E Ratio = 71.70%
- New Beta = 1.026 (1 + 0.64 (.717)) = 1.50

What is the significance of assuming Cap Cities debt?

If the debt had not been assumed and had to be retired, Disney would have had to raise $19,115 million ($18,500 + $615) to fund the acquisition. You would not have added $615 million in debt to the consolidated company after the transaction.

Firm Betas versus divisional Betas

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- Firm Betas as weighted averages: The beta of a firm is the weighted average of the betas of its individual projects.
- Firm Betas and Business betas: At a broader level of aggregation, the beta of a firm is the weighted average of the betas of its individual division.

The same principle applies to a firm. To the degree that the firm is in multiple businesses, its beta reflects all of these businesses.

Bottom-up versus Top-down Beta

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

Bottom-up betas build up to the beta from the fundamentals, rather than trusting the regression.

The standard error of an average beta for a sector, is smaller by a factor of $\sqrt{n}$, where n is the number of firms in the sector. Thus, if there are 25 firms in a sector, the standard error of the average is 1/5 the average standard error.

Disney's businesses: The financial breakdown (from 2013 annual report)

Business	*Revenues*	*Operating Income*	*D&A*	*EBITDA*	*S, G & A Costs*	*Cap Ex*	*Identifiable Assets*
Media Networks	$20,356	$6,818	$251	$7,069	$2,768	$263	$28,627
Parks & Resorts	$14,087	$2,220	$1,370	$3,590	$1,960	$2,110	$22,056
Studio Entertainment	$5,979	$661	$161	$822	$2,145	$78	$14,750
Consumer Products	$3,555	$1,112	$146	$1,258	$731	$45	$7,506
Interactive	$1,064	-$87	$44	-$43	$449	$13	$2,311

Disney does break down its divisions very well in its financial statements. Not all companies are this forthcoming and you may have to go on much coarser data, in some cases.

Unlevered Betas for businesses

Unlevered Beta = Unlevered Beta / (1 - 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

Comes from the companies in each sector. Judgment calls had to be made and when the sample size was too small (as was the case with broadcasting and theme parks), I had to broaden my sample, by going up and down the food chain of revenues in the case of broadcasting (by including companies that make revenues from syndicating TV shows, for instance) or going global (parks and resorts). Another solution is to define your business more broadly, allowing for more comparable firms.

When looking for comparable firms, you are not trying to get exact matches with the company you are analyzing. Instead, you are focusing on companies whose economic fortunes are tied to the same macro economic variables as your revenues/earnings are. It is okay to stray out of your specific business, if you follow this principle.

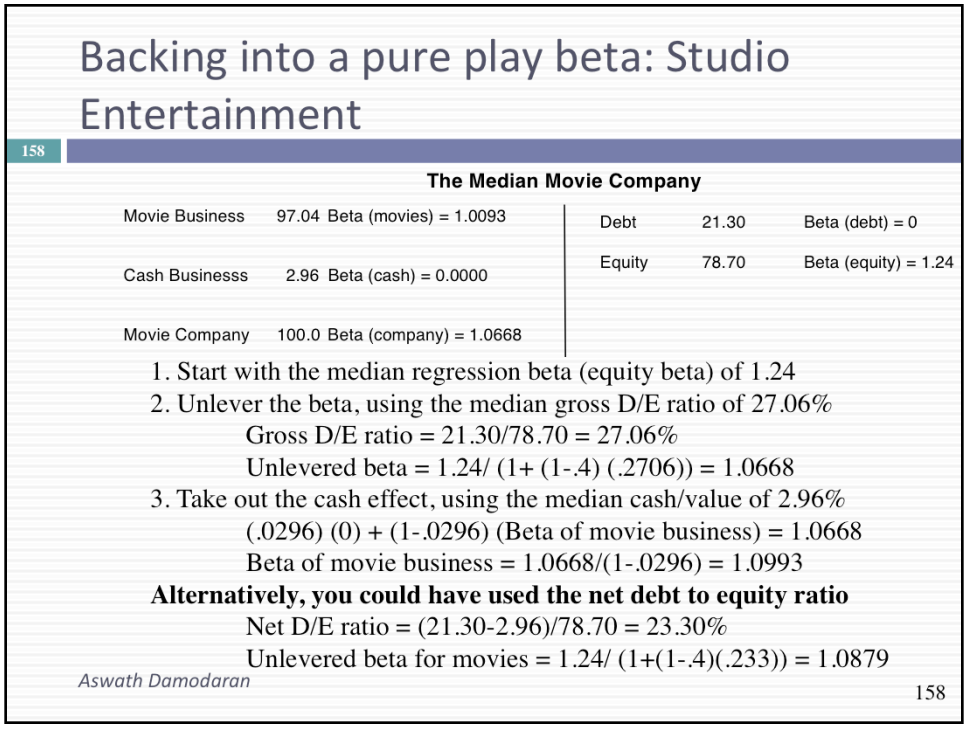
A closer look at the process… Studio Entertainment Betas

Company Name	Levered Beta	Market Cap	Total Debt	Firm Value	Cash	Cash/Firm Value	Enterprise Value	Marginal tax rate	Gross D/E ratio	Unlevered Beta	Pure play beta	EV/Sales
SFX Entertainment	1.12	738.80	$98.89	$837.69	$143.60	17.14%	$694.09	40.00%	13.39%	1.04	1.25	11.20
Mass Hysteria Entertainment	1.19	0.24	$1.13	$1.37	$0.00	0.00%	$1.37	40.00%	477.94%	0.31	0.31	12.45
Medient Studios	0.93	3.21	$3.18	$6.39	$0.05	0.81%	$6.34	40.00%	99.07%	0.58	0.59	1.21
POW! Entertainment	0.94	3.97	$0.34	$4.31	$0.43	9.85%	$3.89	40.00%	8.65%	0.89	0.99	1.92
MGM Holdings	1.29	3631.70	$142.16	$3,773.86	$140.70	3.73%	$3,633.16	40.00%	3.91%	1.26	1.31	1.92
Lions Gate Entertainment	1.20	4719.60	$1,283.20	$6,002.80	$67.20	1.12%	$5,935.60	40.00%	27.19%	1.03	1.04	2.28
DreamWorks Animation	1.32	2730.00	$348.30	$3,078.30	$156.40	5.08%	$2,921.90	40.00%	12.76%	1.23	1.29	3.81
Twenty-First Century Fox	1.28	77743.50	$20,943.00	$98,686.50	$6,681.00	6.77%	$92,005.50	40.00%	26.94%	1.10	1.18	3.20
Independent Film Development	1.61	1.32	$0.96	$2.28	$0.05	2.20%	$2.23	40.00%	72.35%	1.12	1.15	3.37
Odyssey Pictures Corp	2.60	0.30	$1.64	$1.94	$0.00	0.10%	$1.94	40.00%	551.12%	0.60	0.60	2.90
Average	**1.35**					**4.68%**		**40.00%**	**129.33%**	**0.92**	**0.97**	**4.43**
Aggregate	**1.35**	**$89,572.64**	**$22,822.82**	**$112,395.45**	**$7,189.43**	**6.40%**	**$105,206.02**	**40.00%**	**25.48%**	**1.17**	**1.25**	**3.09**
Median	**1.24**					**2.96%**		**40.00%**	**27.06%**	**1.03**	**1.10**	**3.05**

This shows the raw numbers behind one of the line items on the previous page – studio entertainment. It lists the companies used, their market values of equity, total debt outstanding and cash.

We show three summary numbers – the average, the aggregate and the median. The average is skewed by outliers. While both the aggregate and median yield meaningful values, we have chosen to go with the median.

In the last three columns, I have computed the enterprise value = mkt cap + debt – cash, revenues and EV/Revenues. These will be used on the next page.



Using the studio entertainment companies as the base, this page explains the process, step by step.

You always start with a regression or equity beta, then clean up for debt and then for cash. (I assumed a marginal tax rate of 40%, since these were all US firms)

When you use the net debt to equity ratio, which is the practice in much of Europe and Latin America, the answers are close but they will not be the same. With the net debt ratio, you are assuming that debt and cash not only cancel out in terms of risk (equally riskless) but have the same tax effect (that you pay a 40% tax rate on income from cash and get a 40% tax benefit from interest expenses).

Disney's unlevered beta: Operations & Entire Company

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	

Disney has $3.93 billion in cash, invested in close to riskless assets (with a beta of zero). You can compute an unlevered beta for Disney as a company (inclusive of cash):

$$\beta_{Disney} = \beta_{Operating\ Assets}\frac{Value_{Operating\ Assets}}{(Value_{Operating\ Assets}+Value_{Cash})} + \beta_{Cash}\frac{Value_{Cash}}{(Value_{Operating\ Assets}+Value_{Cash})}$$

$$= 0.9239\left(\frac{135,132}{(135,132+3,931)}\right)+0.00\left(\frac{3,931}{(135,132+3,931)}\right)=0.8978$$

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I used revenues and revenue multiples to estimate the values of each business. I could have also used EBIT or EBITDA, by business, and applied a multiple but the problem is with divisions that have negative values for either (as is the case with Interactive for Disney).

The reason that I compute two unlevered beta, one for just the operations and one that includes the cash (and is thus for the entire firm) is that each has its use somewhere along. When computing the cost of capital, which is a cost of funding your operating assets, I will use the former. If I needed a beta for a dividend discount model, where the dividends are paid out of composite earnings, I would use the latter.

The levered beta: Disney and its divisions

- To estimate the debt ratios for division, we allocate Disney's total debt ($15,961 million) to its divisions based on identifiable assets.

Business	Identifiable assets (2013)	Proportion of debt	Value of business	Allocated debt	Estimated equity	D/E ratio
Media Networks	$28,627	38.04%	$66,580	$6,072	$60,508	10.03%
Parks & Resorts	$22,056	29.31%	$45,683	$4,678	$41,005	11.41%
Studio Entertainment	$14,750	19.60%	$18,234	$3,129	$15,106	20.71%
Consumer Products	$7,506	9.97%	$2,952	$1,592	$1,359	117.11%
Interactive	$2,311	3.07%	$1,684	$490	$1,194	41.07%
Disney	$75,250	100.00%		$15,961	$121,878	13.10%

- We use the allocated debt to compute D/E ratios and levered betas.

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%

I allocated the debt based upon the identifiable assets (since these tend to be large, fixed assets, as defined by accountants) and thus more likely to require the use of debt.

Discussion Issue

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- Assume now that you are the CFO of Disney. The head of the movie business has come to you with a new big budget movie that he would like you to fund. He claims that his analysis of the movie indicates that it will generate a return on equity of 9.5%. Would you fund it?
  - Yes. It is higher than the cost of equity for Disney as a company
  - No. It is lower than the cost of equity for the movie business.
  - What are the broader implications of your choice?

The cost of equity for each division should be used. Otherwise, the riskier divisions will over invest and the safest divisions will under invest.

Over time, the firm will become a riskier firm. Think of Bankers Trust from 1980, when it was a commercial bank, to 1992, when it had become primarily an investment bank.

It also means that any multi business company should have different hurdle rates for each business, with higher rates for riskier businesses and lower rates for safer businesses.

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%

Following the same script that I did for Disney, but I did not attempt to allocate the debt across businesses, partly because there was little information available on the allocation and partly because they businesses are more similar in terms of their debt capacity.

Vale: Cost of Equity Calculation – in nominal R$

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

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

- From US $ to R$: If we use 2% as the inflation rate in US dollars and 9% as the inflation ratio in Brazil, we can convert Vale's US dollar cost of equity of 11.23% to a R$ cost of equity:

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

$$= (1.1123)\ \frac{(1.09)}{(1.02)}-1 = 18.87\%$$

- Alternatively, you can compute a cost of equity, starting with the R$ riskfree rate of 10.18%.

Cost of Equity in R$ = = 10.18% + 1.15 (7.38%) = 18.67%

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The cost of equity can be stated in different currencies. When computing the nominal R$ cost of equity, we scale up the risk premium to reflect the fact the the inflation rates (and risk free rates in BR) are much higher.

I prefer the first approach, which is to start with a dollar based cost of capital and scale up for inflation differentials, since all of the risk premiums that I am using come from dollar based markets and scaling up with inflation allows me to scale up the premiums as well..

Bottom up betas & Costs of Equity: Tata Motors & Baidu

- Tata Motors: We estimated an unlevered beta of 0.8601 across 76 publicly traded automotive companies (globally) and estimated a levered beta based on Tata Motor's D/E ratio of 41.41% and a marginal tax rate of 32.45% for India:
  Levered Beta for Tata Motors = 0.8601 (1 + (1-.3245) (.4141)) = 1.1007
  Cost of equity for Tata Motors (Rs) = 6.57% + 1.1007 (7.19%) = 14.49%
- Baidu: To estimate its beta, we looked at 42 global companies that derive all or most of their revenues from online advertising and estimated an unlevered beta of 1.30 for the business. Incorporating Baidu's current market debt to equity ratio of 5.23% and the marginal tax rate for China of 25%, we estimate Baidu's current levered beta to be 1.3560.
  Levered Beta for Baidu = 1.30 (1 + (1-.25) (.0523)) = 1.356
  Cost of Equity for Baidu (Yuan) = 3.50% + 1.356 (6.94%) = 12.91%

Both are single business companies and the beta estimation is made a little easier. I used the global averages for both, simply because there are very few companies in either the domestic markets or even across all emerging markets.

Bottom up Betas and Costs of Equity: Deutsche Bank

- We break Deutsche Bank down into two businesses – commercial and investment banking.

Business	*Sample used*	*Sample size*	*Median Levered Beta*	*Deutsche Net Revenues in 2012*	*Proportion*
Banking	European diversified banks	84	1.0665	19,019 mil €	54.86%
Investment Banking	Global investment banks	58	1.2550	15,648 mil €	45.14%
Deutsche Bank			1.1516	34,667 mil €	

- We do not unlever or relever betas, because estimating debt and equity for banks is an exercise in futility. Using a riskfree rate of 1.75% (Euro risk free rate) and Deutsche's ERP of 6.12%:

Business	*Beta*	*Cost of Equity*
Commercial banking	1.0665	1.75%+1.0665 (6.12%) = 8.28%
Investment Banking	1.2550	1.75%+1.2550 (6.12%) = 9.44%
Deutsche Bank	1.1516	1.75%+1.1516 (6.12%) = 8.80%

Investment banking is riskier and should require a higher return. (In fact, if you could break investment banking down into its component parts, you could get very different costs of equity within that business).

Estimating Betas for Non-Traded Assets

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

Private firms are not traded. There are no historical price records to compute betas from.

Using comparable firms to estimate beta for Bookscape

Company Name	*Industry*	*Market Capitalization*	*Levered Beta*	*Marginal tax rate*	*Gross D/E ratio*	*Cash/Firm Value*	R^2
Red Giant Entertainment	Publishing	$2.13	0.69	40.00%	0.00%	0.05%	0.1300
CTM Media Holdings	Publishing	$25.20	1.04	40.00%	17.83%	33.68%	0.1800
Books-A-Million	Book Stores	$38.60	1.42	40.00%	556.55%	4.14%	0.1900
Dex Media	Publishing	$90.50	4.92	40.00%	3190.39%	7.86%	0.2200
Martha Stewart Living	Publishing	$187.70	1.11	40.00%	19.89%	15.86%	0.3500
Barnes & Noble	Book Stores	$939.30	0.11	40.00%	164.54%	3.22%	0.2600
Scholastic Corporation	Publishing	$953.80	1.08	40.00%	21.41%	1.36%	0.2750
John Wiley	Publishing	$2,931.40	0.81	40.00%	29.58%	5.00%	0.3150
Washington Post	Publishing	$4,833.20	0.68	40.00%	21.04%	16.04%	0.2680
News Corporation	Publishing	$10,280.40	0.49	40.00%	8.73%	24.05%	0.2300
Thomson Reuters	Publishing	$31,653.80	0.62	40.00%	26.38%	1.68%	0.2680
Average			**1.1796**	**40.00%**	**368.76%**	**10.27%**	**0.2442**
Median			**0.8130**	**40.00%**	**21.41%**	**5.00%**	**0.2600**

Unlevered beta for book company = 0.8130/ (1+ (1-.4) (.2141)) = 0.7205
Unlevered beta for book business = 0.7205/(1-.05) = 0.7584

To estimate the bottom up beta, we initially looked at publicly traded book retail firms but found only two firms. To add to the sample, we looked at publishing firms, arguing that their risk should be similar to that of book retailers (We are open to the critique that the operating leverage can be different in the two businesses). To keep outliers (like the 3190% debt to equity ratio for Dex Media) from skewing results, we will use median values for the firms in the sample.

Estimating Bookscape Levered Beta and Cost of Equity

- Because the debt/equity ratios used in computing levered betas are market debt equity ratios, and the only debt equity ratio we can compute for Bookscape is a book value debt equity ratio, we have assumed that Bookscape is close to the book industry median market debt to equity ratio of 21.41 percent.
- Using a marginal tax rate of 40 percent for Bookscape, we get a levered beta of 0.8558.

  Levered beta for Bookscape = 0.7584[1 + (1 – 0.40) (0.2141)] = 0.8558
- Using a riskfree rate of 2.75% (US treasury bond rate) and an equity risk premium of 5.5%:

  Cost of Equity = 2.75%+ 0.8558 (5.5%) = 7.46%

If you cannot get a target debt to equity ratio for a private firm, use an industry -average debt to equity ratio to compute the levered beta. It will give you a more meaningful estimate than using book debt to equity ratios.

Is Beta an Adequate Measure of Risk for a Private Firm?

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

Using beta (that looks at only market risk) will tend to under estimate the cost of equity since private owners feel exposed to all risk, if they are not diversified.

Total Risk versus Market Risk

- Adjust the beta to reflect total risk rather than market risk. This adjustment is a relatively simple one, since the R squared of the regression measures the proportion of the risk that is market risk.
  - Total Beta = Market Beta / Correlation of the sector with the market
- In the Bookscape example, where the market beta is 0.8558 and the median R-squared of the comparable publicly traded firms is 26.00%; the correlation with the market is 50.99%.

$$\frac{\text{Market Beta}}{\sqrt{\text{R squared}}} = \frac{0.8558}{.5099} = 1.6783$$

  - Total Cost of Equity = 2.75 + 1.6783 (5.5%) = 11.98%

This assumes that

> The owner of the private business has all of his or her wealth invested in the business
>
> The reality is that most individuals will fall somewhere between the two extremes. A private equity or VC investor may hold several positions in their portfolio, pushing up the R-squared of their portfolio with the market and pushing down the total beta.

If you were a private business looking at potential acquirers - one is a publicly traded firm and the other is an individual . Which one is likely to pay the higher price and why?

> If both acquirers have the same cash flow expectations, the publicly traded firm will win out (Blockbuster Video, Browning-Ferris are good examples of publicly traded firms which bought small private businesses to grow to their current stature.)

This approach can be extended to cover investors who are partially diversified such as venture capitalists and private equity investors. Instead of using the correlation of firms in the business with the market, we would use the correlation of the investor's portfolio with the market. As the investor gets more diversified, the correlation will rise and the total beta will fall towards the market beta.

Application Test: Estimating a Bottom-up Beta

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

- Data Source: You can get a listing of unlevered betas by industry on my web site by going to updated data.

The breakdown of a firm into businesses is available in the 10-K. The unlevered betas are available on my web site.

From Cost of Equity to Cost of Capital

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

Capital is more than just equity. It also includes other financing sources, particularly debt.

What is debt?

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- General Rule: Debt generally has the following characteristics:
  - Commitment to make fixed payments in the future
  - The fixed payments are tax deductible
  - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- As a consequence, debt should include
  - Any interest-bearing liability, whether short term or long term.
  - Any lease obligation, whether operating or capital.

Debt is not restricted to what gets called debt in the balance sheet. It includes any financing with these characteristics.

Applying this test to items on the liability side of the balance sheet, we would conclude that

-All interest bearing debt, short term as well as long term, is debt

-Accounts payable and suppliers should not be considered debt because they don't carry explicit interest expenses; they should be considered as part of working capital. Alternatively, you can try to make the implicit interest expenses (the discount you could have received by paying early rather than late) explicit and treat it as debt.

-Other liabilities such as under funded pension or health care obligations are best not considered as debt (though there may be exceptions) since the commitments are flexible.

Estimating the Cost of Debt

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- 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.

There are two key components to the cost of debt:

a. You want a long-term cost (I use a 10-year cost) of debt even if your debt is short term. You do not want to reward companies that play the term structure by giving them a lower cost of debt and capital. In effect, you are assuming that the rolled over cost of short term debt = cost of long term debt.

b. You want a current cost. In other words, you do not care about the debt and interest expenses on the books. The book interest rate (interest expense/ book debt) is not a good measure of the cost of debt because it does not reflect the current cost of borrowing any may even be lower than the riskfree rate.

While the cost of debt can be estimated easily for some firms, by looking up traded bonds, it can be more difficult for non-rated firms. The default spreads can be obtained from

http://www.bondsonline.com

It will cost you money, but you will get updated values. You can get partially updated numbers from my website (under updated data)>

The easy route: Outsourcing the measurement of default risk

- For those firms that have bond ratings from global ratings agencies, I used those ratings:

Company	S&P Rating	Risk-Free Rate	Default Spread	Cost of Debt
Disney	A	2.75% (US $)	1.00%	3.75%
Deutsche Bank	A	1.75% (Euros)	1.00%	2.75%
Vale	A-	2.75% (US $)	1.30%	4.05%

- If you want to estimate Vale's cost of debt in R$ terms, we can again use the differential inflation approach we used for the cost of equity:

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

$$= (1.0405)\frac{(1.09)}{(1.02)} - 1 = 11.19\%\%$$

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You are trusting the ratings agencies to be right and to have incorporated all default risk (company as well as country) into the rating. With Vale, therefore, you are assuming that the ratings agency has incorporated both the risk of Vale and Brazil in its rating. (Ratings agencies claim they do…)

A more general route: 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 the non-financial service companies, we obtain the following:

Company	Operating income	Interest Expense	Interest coverage ratio
Disney	$10.023	$444	22.57
Vale	$15,667	$1,342	11.67
Tata Motors	Rs 166,605	Rs 36,972	4.51
Baidu	CY 11,193	CY 472	23.72
Bookscape	$2,536	$492	5.16

Basing the rating on just an interest coverage ratio will give you an approximation for the rating. A more realistic approach would use more than the interest coverage ratio. In fact, we could construct a score based upon multiple ratios (such as a Z-score) and use that score to estimate ratings.

The operating income used to compute the rating does not have to be last year's number. It can be an average over time or a normalized value.

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
Tata Motors: Large cap, Emerging	4.51	→	A-
Baidu: Small cap, Emerging	23.72	→	AAA
Bookscape: Small cap, private	5.16	→	A-

This table is constructed, using smaller non-financial service companies (<$5 billion market cap) that are rated, and their interest coverage ratios. The firms were sorted based upon their ratings, and the interest coverage range was estimated.

These ranges will change over time, especially as the economy strengthens or weakens. You can get the updated ranges on my web site.

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.
- Deutsche Bank had an A rating. We will not try to estimate a synthetic rating for the bank. Defining interest expenses on debt for a bank is difficult…

The synthetic ratings process will deliver reasonably close ratings for any firm with debt of substance. It will tend to overstate ratings for firms with little debt (technology firms often will get AAA ratings because their interest coverage ratios are so high). The fact that these ratings are too high is not an issue because these companies also have so little debt in their capital structure - the cost of capital is very close to the cost of equity.

Can we trust rating agencies? In general, ratings agencies do a reasonable job of assessing default risk and offer us these measures for free (at least to investors). They have two faults: (1) They adjust for changes in default risk too slowly. All too often ratings downgrades follow bond price declines and not the other way around (2) They sometimes get caught up in the mood of the moment and either overestimate default risk or underestimate default risk for an entire sector.

It is a good idea to estimate synthetic ratings even for firms that have actual ratings. If there is disagreement between ratings agencies or a firm has multiple bond ratings, the synthetic rating can operate as a tie-breaker. If there is a significant difference between actual and synthetic ratings and there is no fundamental reason that can be pinpointed for the difference, the synthetic rating may be providing an early signal of a ratings agency mistake.

Estimating Cost of Debt

- For Bookscape, we will use the synthetic rating (A-) to estimate the cost of debt:
  - Default Spread based upon A- rating = 1.30%
  - Pre-tax cost of debt = Riskfree Rate + Default Spread = 2.75% + 1.30% = 4.05%
  - After-tax cost of debt = Pre-tax cost of debt (1- tax rate) = 4.05% (1-.40) = 2.43%
- For the three publicly traded firms that are rated in our sample, we will use the actual bond ratings to estimate the costs of debt.

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%
Deutsche Bank	A	1.75% (Euros)	1.00%	2.75%	29.48%	1.94%
Vale	A-	2.75% (US $)	1.30%	4.05%	34%	2.67%

- For Tata Motors, we have a rating of AA- from CRISIL, an Indian bond-rating firm, that measures only company risk. Using that rating:

  Cost of debt$_{TMT}$ = Risk free rate$_{Rupees}$ + Default spread$_{India}$ + Default spread$_{TMT}$
  = 6.57% + 2.25% + 0.70% = 9.62%

  After-tax cost of debt = 9.62% (1-.3245) = 6.50%

The tax rate used is the marginal tax rate…. Interest saves you taxes on your marginal income, not the first or average dollar of income….

The marginal tax rate comes from the tax code and as relatively little to do with your company. For US companies, it should be 35%+. For non-US companies, it will reflect the tax rates in those countries (low in HK and Singapore, higher in Europe and Latin America…)

For Tata Motors, we added the country default spread on to the company default spread to reflect the fact that Tata has to bear the burden of country risk when it borrows. (We skipped this step with Vale because we used the actual rating, which already reflects Brazil country risk)

For Disney, Deutsche Bank and Vale, we chose to use the actual ratings rather than the synthetic rating, because it does contain more information.

Updated Default Spreads – January 2014

Rating	1 year	5 year	10 Year	30 year
Aaa/AAA	0.05%	0.18%	0.42%	0.65%
Aa1/AA+	0.11%	0.37%	0.57%	0.82%
Aa2/AA	0.16%	0.55%	0.71%	0.98%
Aa3/AA-	0.22%	0.60%	0.75%	0.99%
A1/A+	0.26%	0.65%	0.78%	1.00%
A2/A	0.33%	0.67%	0.84%	1.12%
A3/A-	0.46%	0.84%	1.00%	1.26%
Baa1/BBB+	0.58%	1.09%	1.32%	1.67%
Baa2/BBB	0.47%	1.27%	1.52%	1.91%
Baa3/BBB-	0.95%	1.53%	1.78%	2.18%
Ba1/BB+	1.68%	2.29%	2.59%	2.97%
Ba2/BB	2.40%	3.04%	3.39%	3.77%
Ba3/BB-	3.12%	3.80%	4.20%	4.57%
B1/B+	3.84%	4.56%	5.01%	5.36%
B2/B	4.56%	5.31%	5.81%	6.16%
B3/B-	5.28%	6.06%	6.62%	6.96%
Caa/CCC+	6.00%	6.82%	7.43%	7.75%

This table should be updated frequently and should have current default spreads in it. These will be the spreads you use for your synthetic ratings today.

Application Test: Estimating a Cost of Debt

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- Based upon your firm's current earnings before interest and taxes, its interest expenses, estimate
  - An interest coverage ratio for your firm
  - A synthetic rating for your firm (use the tables from prior pages)
  - A pre-tax cost of debt for your firm
  - An after-tax cost of debt for your firm

To estimate the after-tax cost of debt, you need a marginal tax rate. Since the federal tax rate for corporations is 35%, I would expect the marginal tax rate to be 35% of higher for US companies. Thus, even if the effective tax rate reported in the financial statements are lower, I would use at least 35%. If the effective tax rate is higher than 35%, I would use the effective tax rate, with the assumption that it is capturing other taxes that the firm has to pay.

To get marginal tax rates for other countries, try this data set that I keep updated on my website:

http://www.stern.nyu.edu/~adamodar/pc/datasets/countrytaxrates.xls

Costs of Hybrids

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- Preferred stock shares some of the characteristics of debt - the preferred dividend is pre-specified at the time of the issue and is paid out before common dividend -- and some of the characteristics of equity - the payments of preferred dividend are not tax deductible. If preferred stock is viewed as perpetual, the cost of preferred stock can be written as follows:
  - kps = Preferred Dividend per share/ Market Price per preferred share
- Convertible debt is part debt (the bond part) and part equity (the conversion option). It is best to break it up into its component parts and eliminate it from the mix altogether.

The easiest way to break down a convertible bond is to value it as a straight bond and to then assign the remaining market value to the conversion option. In March 2004,for example, Disney had convertible bonds outstanding with 19 years left to maturity and a coupon rate of 2.125%, trading at $1,064 a bond. Holders of this bond have the right to convert the bond into 33.9444 shares of stock anytime over the bond's remaining life. To break the convertible bond into straight bond and conversion option components, we will value the bond using Disney's pre-tax cost of debt of 5.25%:

At this conversion ratio, the price that investors would be paying for Disney shares would be $29.46, much higher than the stock price of $20.46 prevailing at the time of the analysis.

This rate was based upon a 10-year treasury bond rate. If the 5-year treasury bond rate had been substantially different, we would have recomputed a pre-tax cost of debt by adding the default spread to the 5-year rate.

Straight Bond component

= Value of a 2.125% coupon bond due in 19 years with a market interest rate of 5.25%

= PV of $21.25 in coupons each year for 19 years + PV of $1000 at end of year 19 = $629.91

Conversion Option= Market value of convertible – Value of straight bond

Weights for Cost of Capital Calculation

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- The weights used in the cost of capital computation should be market values.
- There are three specious arguments used against market value
  - Book value is more reliable than market value because it is not as volatile: While it is true that book value does not change as much as market value, this is more a reflection of weakness than strength
  - Using book value rather than market value is a more conservative approach to estimating debt ratios: For most companies, using book values will yield a lower cost of capital than using market value weights.
  - Since accounting returns are computed based upon book value, consistency requires the use of book value in computing cost of capital: While it may seem consistent to use book values for both accounting return and cost of capital calculations, it does not make economic sense.

Assume that the market value debt ratio is 10%, while the book value debt ratio is 30%, for a firm with a cost of equity of 15% and an after-tax cost of debt of 5%. The cost of capital can be calculated as follows –

With market value debt ratios: 15% (.9) + 5% (.1) = 14%

With book value debt ratios: 15% (.7) + 5% (.3) = 12%

Which is the more conservative estimate?

Since 85% of US firms have market values of equity that exceed the book values of equity by significant percentages, it follows that using book value debt ratios will understate costs of capital for most companies.

Disney: From book value to market value for interest bearing debt…

- In Disney's 2013 financial statements, the debt due over time was footnoted.

Time due	Amount due	Weight	Weight *Maturity
0.5	$1,452	11.96%	0.06
2	$1,300	10.71%	0.21
3	$1,500	12.36%	0.37
4	$2,650	21.83%	0.87
6	$500	4.12%	0.25
8	$1,362	11.22%	0.9
9	$1,400	11.53%	1.04
19	$500	4.12%	0.78
26	$25	0.21%	0.05
28	$950	7.83%	2.19
29	$500	4.12%	1.19
	$12,139		7.92

The debt in this table does not add up to the book value of debt, because Disney does not break down the maturity of all of its debt.

- Disney's total debt due, in book value terms, on the balance sheet is $14,288 million and the total interest expense for the year was $349 million. Using 3.75% as the pre-tax cost of debt:
- Estimated MV of Disney Debt = $349\left[\frac{(1-\frac{1}{(1.0375)^{7.92}}}{.0375}\right]+\frac{14,288}{(1.0375)^{7.92}}=\$13,028 \text{ million}$

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We first consolidate all of the debt outstanding and obtain an face value weighted average maturity for the debt of 7.92 years.

We then compute the market value of debt, setting the book value = face value, the interest expense = coupon, the average maturity = debt maturity and the pre-tax cost of debt based on the synthetic rating as the cost of debt.

Alternatively, we can compute the market value of each debt item separately and add up the values.

Operating Leases at Disney

- The "debt value" of operating leases is the present value of the lease payments, at a rate that reflects their risk, usually the pre-tax cost of debt.
- The pre-tax cost of debt at Disney is 3.75%.

Year	Commitment	Present Value @3.75%
1	$507.00	$488.67
2	$422.00	$392.05
3	$342.00	$306.24
4	$272.00	$234.76
5	$217.00	$180.52
6-10	$356.80	$1,330.69
Debt value of leases		$2,932.93

Disney reported $1,784 million in commitments after year 5. Given that their average commitment over the first 5 years, we assumed 5 years @ $356.8 million each.

- Debt outstanding at Disney = $13,028 + $ 2,933= $15,961 million

The pre-tax cost of debt was based upon Disney's current rating.

Disney reports a lump sum as the amount due after year 6…. We break it up into annual payments based upon the average lease payments over the first 5 years…You could also use the year 5 payment as the basis for making this adjustment (Putting it all in year 6 will overstate the present value).

To get to the total market value of debt, we add the estimated market value of interest bearing debt to the present value of operating leases (already a market value number since you used the current pre-tax cost of borrowing to arrive at the value).

Application Test: Estimating Market Value

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

For most firms, the book debt ratio will be much higher than the market debt ratio. Using the book debt ratio will therefore yield a lower cost of capital (which undercuts the conservatism argument used by defenders of book value weights)

Current Cost of Capital: Disney

- Equity
  - Cost of Equity = Riskfree rate + Beta * Risk Premium
    = 2.75% + 1.0013 (5.76%) = 8.52%
  - Market Value of Equity = $121,878 million
  - Equity/(Debt+Equity) = 88.42%
- Debt
  - After-tax Cost of debt =(Riskfree rate + Default Spread) (1-t)
    = (2.75%+1%) (1-.361) = 2.40%
  - Market Value of Debt = $13,028+ $2933 = $ 15,961 million
  - Debt/(Debt +Equity) = 11.58%
- Cost of Capital = 8.52%(.8842)+ 2.40%(.1158) = 7.81%

121,878/ (121,878+15,961)

This reproduces the current cost of capital computation for Disney, using market value weights for both debt and equity, the cost of equity (based upon the bottom-up beta) and the cost of debt (based upon the bond rating)

The market value of debt is estimated by estimating the present value of total interest payments and face value at the current cost of debt.

One way to frame the capital structure question: Is there a mix of debt and equity at which Disney's cost of capital will be lower than 7.81%?

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%

For Disney, we used the division specific debt ratio weights we estimated earlier (when estimating the levered beta). We did assume that all divisions borrow at Disney's pre-tax cost of debt. If the divisions issued debt independently, we would have considered using division-specific costs of debt.

For Vale, we used the same debt ratio and cost of debt for both divisions.

The cost of capital for Vale will be higher in R$, because we expect inflation to be 9% in R$ and only 2% in US dollars.

Costs of Capital: Tata Motors, Baidu and Bookscape

- To estimate the costs of capital for Tata Motors in Indian rupees:

  Cost of capital= 14.49% (1-.2928) + 6.50% (.2928) = 12.15%

- For Baidu, we follow the same path to estimate a cost of equity in Chinese RMB:

  Cost of capital = 12.91% (1-.0523) + 3.45% (.0523) = 12.42%

- For Bookscape, the cost of capital is different depending on whether you look at market or total beta:

	Cost of equity	Pre-tax Cost of debt	After-tax cost of debt	D/(D+E)	Cost of capital
Market Beta	7.46%	4.05%	2.43%	17.63%	6.57%
Total Beta	11.98%	4.05%	2.43%	17.63%	10.30%

For Bookscape, the cost of capital is much higher for the undiversified owner than it is for a diversified investor in a similar company.

Application Test: Estimating Cost of Capital

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- Using the bottom-up unlevered beta that you computed for your firm, and the values of debt and equity you have estimated for your firm, estimate a bottom-up levered beta and cost of equity for your firm.
- Based upon the costs of equity and debt that you have estimated, and the weights for each, estimate the cost of capital for your firm.
- How different would your cost of capital have been, if you used book value weights?

To go from unlevered to levered betas and then to the cost of capital, you have to

1. Define debt and compute market value
2. Compute the present value of operating leases
3. Compute the levered beta, using the market value of equity and the consolidated market value of debt (including lease commitmetns)
4. Compute the cost of capital, using the debt and equity weights.

Choosing a Hurdle Rate

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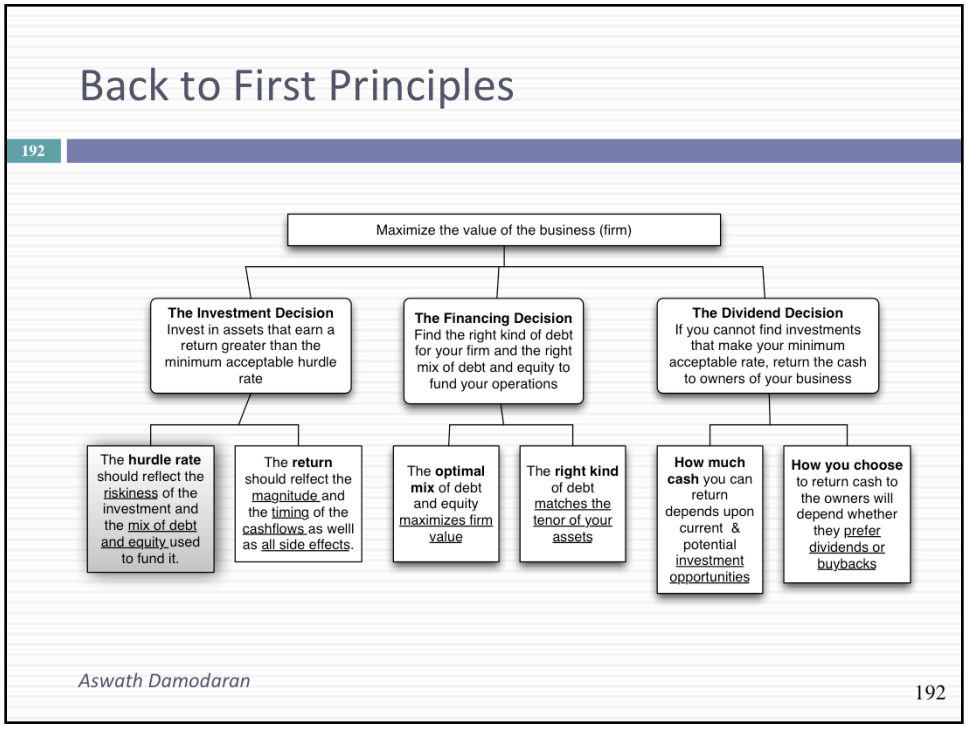
- Either the cost of equity or the cost of capital can be used as a hurdle rate, depending upon whether the returns measured are to equity investors or to all claimholders on the firm (capital)
- If returns are measured to equity investors, the appropriate hurdle rate is the cost of equity.
- If returns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

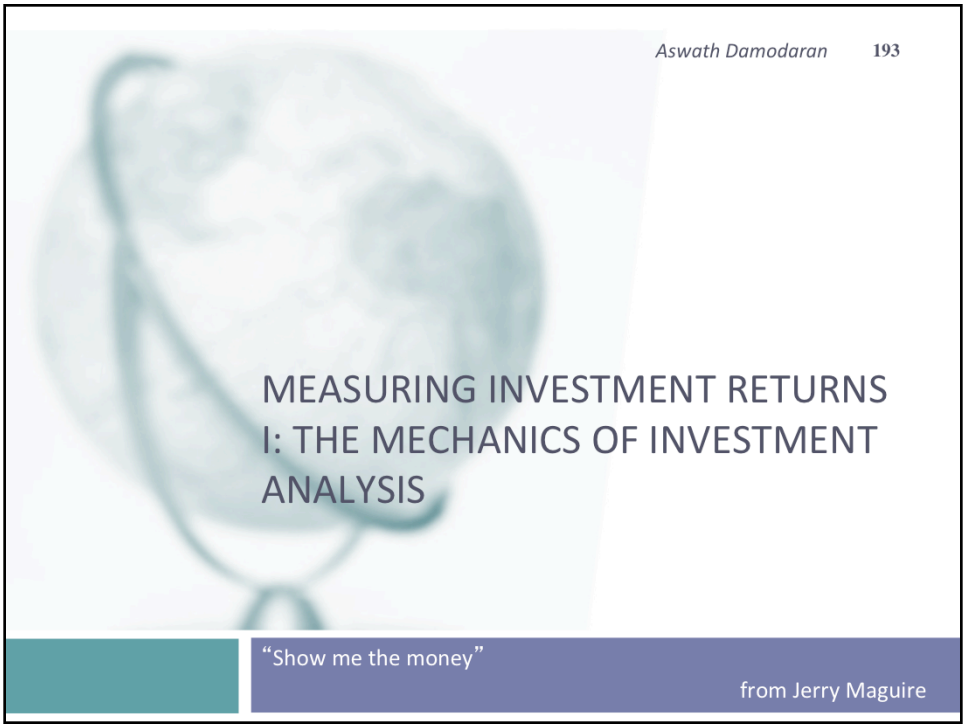
While the cost of equity and capital can be very different numbers, they can both be used as hurdle rates, as long as the returns and cash flows are defined consistently.

If returns and cash flows are equity based (return on equity or cash flow to equity), the appropriate hurdle rate is the cost of equity.

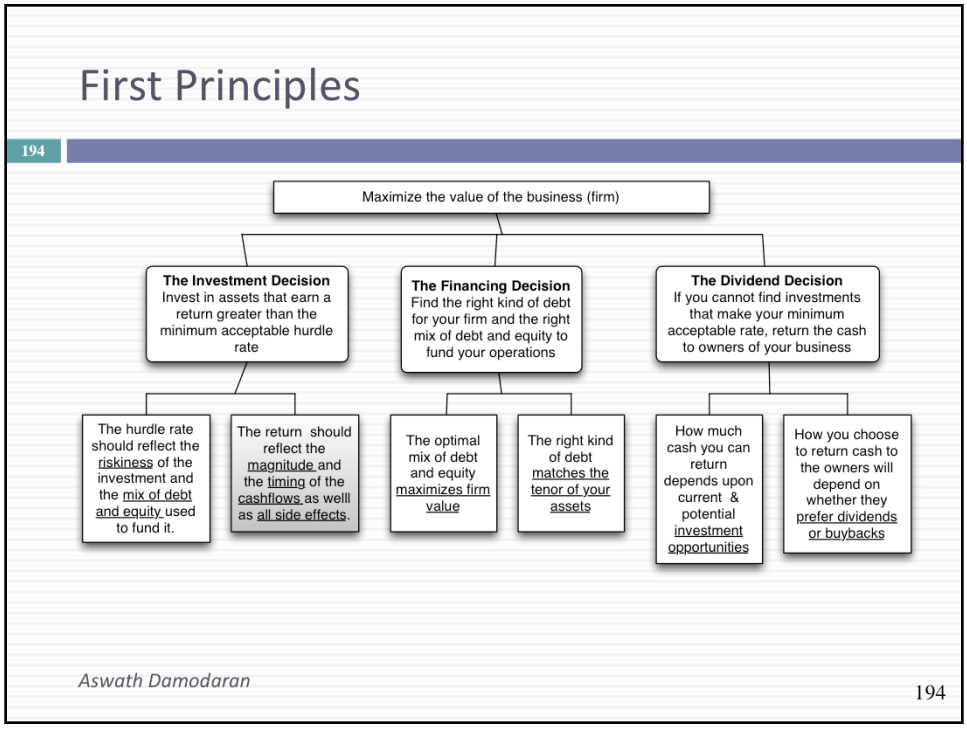
If returns and cash flows are firm or operating asset based (return on capital or cashflows to firm), the appropriate hurdle rate is the cost of capital.



Took us a while but we have the mechanics of the hurdle rate down..



If there is a theme to how we think about returns in corporate finance, this line from Jerry Maguire brings it home. We trust the concrete over the vague and cash flows over earnings.



The next section of the notes will focus on measuring returns on investments, provide an argument for why cash flows make more sense than earnings and weighing those cash flows and discuss how best to bring in side benefits and costs into the returns.

Measures of return: earnings versus cash flows

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- Principles Governing Accounting Earnings Measurement
  - Accrual Accounting: Show revenues when products and services are sold or provided, not when they are paid for. Show expenses associated with these revenues rather than cash expenses.
  - Operating versus Capital Expenditures: Only expenses associated with creating revenues in the current period should be treated as operating expenses. Expenses that create benefits over several periods are written off over multiple periods (as depreciation or amortization)
- To get from accounting earnings to cash flows:
  - you have to add back non-cash expenses (like depreciation)
  - you have to subtract out cash outflows which are not expensed (such as capital expenditures)
  - you have to make accrual revenues and expenses into cash revenues and expenses (by considering changes in working capital).

Accrual accounting income is designed to measure the "income" made by an entity during a period, on sales made during the period. Thus, accrual accounting draws lines between operating expenses (that create income in the current period), financial expenses (expenses associated with the use of debt) and capital expenditures (which create income over multiple periods). It is not always consistent. R&D, for instance, is treated as an operating expense.

Accrual accounting also tries to allocate the cost of materials to current period revenues, leading to inventory, and give the company credit for sales made during the period, even if cash has not been received, giving rise to accounts receivable. In effect, adding in the change in working capital converts accrual earnings to cash earnings.

Measuring Returns Right: The Basic Principles

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- 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.

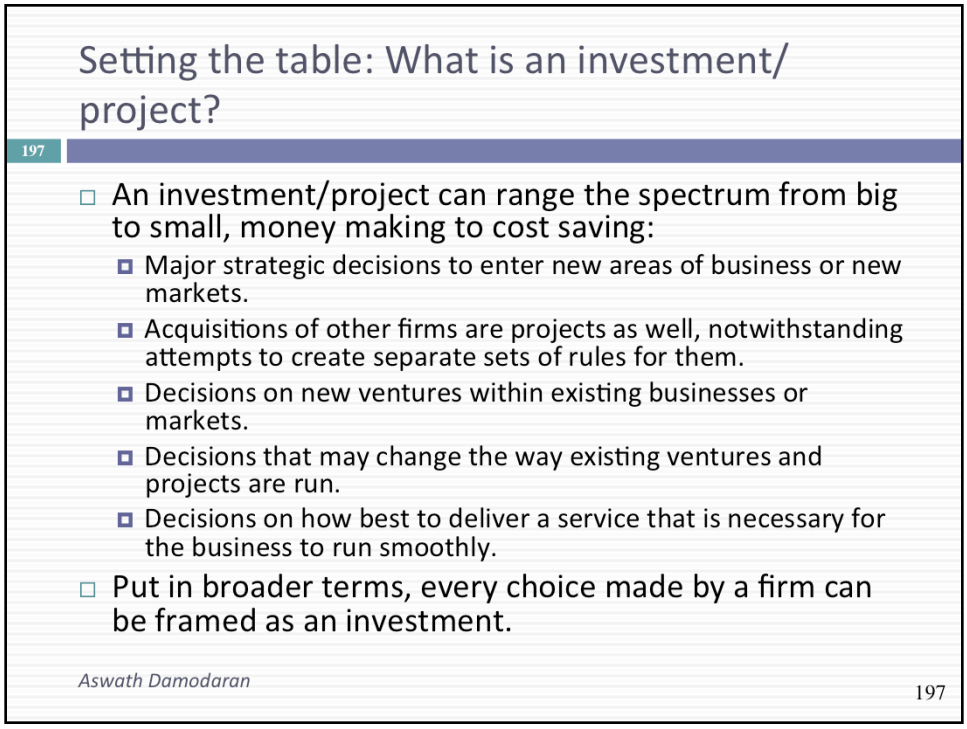
The Return Mantra: "Time-weighted, Incremental Cash Flow Return"

These are the basic financial principles underlying the measurement of investment returns.

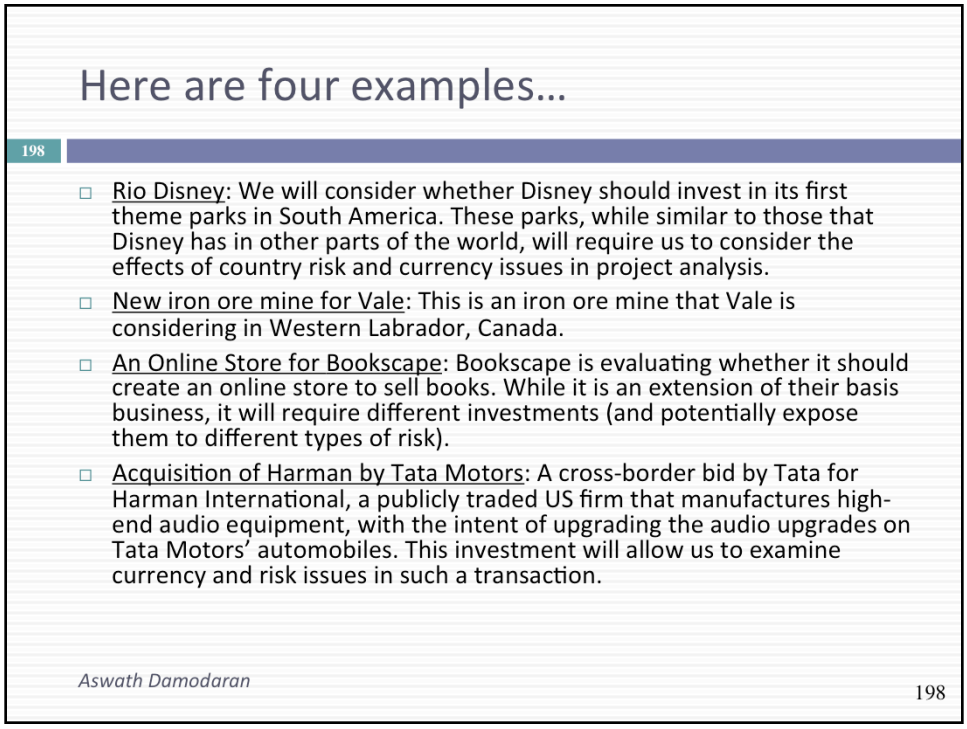
We focus on cash flows, because when cash flows and earnings are different, cash flows provide a more reliable measure of what an investment generates.

We focus on "incremental" effects on the overall business, since we care about the overall health and value of the business, not just individual projects.

We use time-weighted returns, since returns made earlier are worth more than the same returns made later.



The discussion of what is a "good investment" that follows applies to pretty much everything that firms do… Put another way, the rules we develop are general ones and cannot be altered or modified just because a specific investment is too big or too small…



These investments range the spectrum, from small to large, extensions of existing businesses to acquisitions. The emphasis will be that the principles of investment analysis do not change, no matter what type of investment you are looking at.

Earnings versus Cash Flows: A Disney Theme Park

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- 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.

The earnings and cash flows will really be in Brazilian R$. We will consider later the effects of looking at all the cash flows in a different currency.

Note that this investment is not going to be fully operational until the fourth year.

Key Assumptions on Start Up and Construction

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- Disney has already spent $0.5 Billion researching the proposal and getting the necessary licenses for the park; none of this investment can be recovered if the park is not built. This expenditure has been capitalized and will be depreciated straight line over ten years to a salvage value of zero.
- Disney will face substantial construction costs, if it chooses to build the theme parks.
  - The cost of constructing Magic Kingdom will be $3 billion, with $ 2 billion to be spent right now, and $1 Billion to be spent one year from now.
  - The cost of constructing Epcot II will be $ 1.5 billion, with $ 1 billion to be spent at the end of the second year and $0.5 billion at the end of the third year.
  - These investments will be depreciated based upon a depreciation schedule in the tax code, where depreciation will be different each year.

The emphasis in the second item should be on "already spent".

While we often classify all these investments as "initial investments", they occur over time. Companies seldom make large investments at an instant in time.

Also worth adding: Disney will fund this investment using the same mix of debt and equity that it uses for theme parks currently.

Key Revenue Assumptions

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- Revenue estimates for the parks and resort properties (in millions)

Year	Magic Kingdom	Epcot II	Resort Properties	Total
1	$0	$0	$0	$0
2	$1,000	$0	$250	$1,250
3	$1,400	$0	$350	$1.750
4	$1,700	$300	$500	$2.500
5	$2,000	$500	$625	$3.125
6	$2,200	$550	$688	$3,438
7	$2,420	$605	$756	$3,781
8	$2,662	$666	$832	$4,159
9	$2,928	$732	$915	$4,575
10	$2,987	$747	$933	$4,667

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These are assumptions. Most real investments involve uncertainty about the future, but we have to make a judgment on what we "expect" to make. These expectations may be based upon past experience or market testing. (For instance, Disney would make these forecasts by looking at the history of Disneyland., EuroDisney and DisneyWorld).

Note that these are not conservative or low-ball estimates. Using lower numbers than expected (because a project is risky or because you are risk-averse) can lead to risk being double counted.

There is an alternative approach to capital budgeting where we can estimate what are called certainty equivalent cash flows, but the discount rate in that case would be the riskfree rate.

Finally, note that the project continues after year 10.

Key Expense Assumptions

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- The operating expenses are assumed to be 60% of the revenues at the parks, and 75% of revenues at the resort properties.
- Disney will also allocate corporate general and administrative costs to this project, based upon revenues; the G&A allocation will be 15% of the revenues each year. It is worth noting that a recent analysis of these expenses found that only one-third of these expenses are variable (and a function of total revenue) and that two-thirds are fixed.

Again, these numbers are easier to estimate in an investment like this one, where Disney can look at similar investments that it has made in the past.

Most large firms have significant expenses that cannot be traced to individual projects. These expenses are sometimes lumped under General and Administrative expenses (G&A) and get allocated to projects.

Depreciation and Capital Maintenance

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Year	*Depreciation as % of Book Value*	*Capital Maintenance as % of Depreciation*
1	0.00%	0.00%
2	12.50%	50.00%
3	11.00%	60.00%
4	9.50%	70.00%
5	8.00%	80.00%
6	8.00%	90.00%
7	8.00%	100.00%
8	8.00%	105.00%
9	8.00%	110.00%
10	8.00%	110.00%

- The capital maintenance expenditures are low in the early years, when the parks are still new but increase as the parks age.

This is accrual accounting at work. Some expenses such as regular maintenance expenses will be treated as operating, but some expenses (such as replacing a significant portion of an existing amusement park ride) will be treated as capital expenditures. The capital expenditures on this page are maintenance capital expenditures, designed to keep the parks in operational condition, generating revenues in the long term, and are on top of the initial capital expenditures.

The depreciation is the total depreciation on all fixed assets. Note that capital expenditures moves towards depreciation over time, reflecting the fact that on a long lived project, the cash inflow from depreciation will have to be reinvested back into the project to preserve the earning power of the assets.

Other Assumptions

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- Disney will have to maintain non-cash working capital (primarily consisting of inventory at the theme parks and the resort properties, netted against accounts payable) of 5% of revenues, with the investments being made at the end of each year.
- The income from the investment will be taxed at Disney's marginal tax rate of 38%.

This will be a drain on the cash flows, since revenues are growing. This, in turn, will create larger inventory and working capital needs each year, which will tie up more cash in the project.

The tax rate used is the marginal tax rate (as opposed to the effective tax rate reported in income statements and annual reports) because projects create income at the margin and will be taxed at the margin.

Laying the groundwork: Book Capital, Working Capital and Depreciation

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	0	1	2	3	4	5	6	7	8	9	10
Book Value of Pre-project inv	*$500*	*$450*	*$400*	*$350*	*$300*	*$250*	*$200*	*$150*	*$100*	*$50*	*$0*
Depreciation: Pre-Project		$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
Magic Kingdom	$2,000	$1,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Epcot Rio	$0	$0	$1,000	$500	$0	$0	$0	$0	$0	$0	$0
Capital Maintenance		$0	$188	$252	$276	$258	$285	$314	$330	$347	$350
- Depreciation on fixed assets		$0	$375	$419	$394	$322	$317	$314	$314	$316	$318
Book Value of new Fixed Assets	*$2,000*	*$3,000*	*$3,813*	*$4,145*	*$4,027*	*$3,962*	*$3,931*	*$3,931*	*$3,946*	*$3,978*	*$4,010*
Book Value of Working Capital			$63	$88	$125	$156	$172	$189	$208	$229	$233
Total Capital Invested in Project	$2,500	$3,450	$4,275	$4,582	$4,452	$4,368	$4,302	$4,270	$4,254	$4,257	$4,243

12.5% of book value at end of prior year ($3,000)

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The depreciation each year is computed by multiplying the book value of fixed assets at the end of the previous year and multiplying by the depreciation percentage specified in the earlier table. IN year 2, for instance, the depreciation is 12.5% of the book value of fixed assets at the end of year 1 ($3,000), yielding $375 million.

The $ 500 million that has been spent already on the project was capitalized. It is depreciated straight line over the 10 years. (If it had been expensed, this would not be necessary)

Step 1: Estimate Accounting Earnings on Project

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	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

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This shows the accounting earnings calculations for the next 10 years. Note the increasing after-tax operating income over time.

Note that loss in year 1. While this loss can be carried forward and offset against profits in future years, we have chosen to claim the losses against Disney's profits from other projects in year 1. (You would rather save taxes now than the same taxes in the future…)

Where are the interest expenses? They do not show up because we are computing earnings to the firm - operating income - rather than earnings to equity - net income.

And the Accounting View of Return

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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

This converts the accounting income into a percentage return (to enable us to do the comparison to the hurdle rate, which is a percentage rate). We have computed a simple average return on capital over the next 10 years…

The average book value is computed each year using the beginning and ending book values. The book values themselves are computed as follows:

Ending BV = Beginning BV - Depreciation + Capital Expenditures

What should this return be compared to?

- The computed return on capital on this investment is about 4.18%. To make a judgment on whether this is a sufficient return, we need to compare this return to a "hurdle rate". Which of the following is the right hurdle rate? Why or why not?
  a. The riskfree rate of 2.75% (T. Bond rate)
  b. The cost of equity for Disney as a company (8.52%)
  c. The cost of equity for Disney theme parks (7.09%)
  d. The cost of capital for Disney as a company (7.81%)
  e. The cost of capital for Disney theme parks (6.61%)
  f. None of the above

First, since we have computed return on capital, the comparison should be to the cost of capital.

Second, since it is a theme park investment, it should be the cost of capital for theme parks.

Here is the catch. This theme park is in Brazil, an emerging market. Thus, the cost of capital of 6.61% that we estimated for existing theme parks, which are in developed markets, may be too low.

So, the answer is "**none of the above**".

Should there be a risk premium for foreign projects?

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- The exchange rate risk should be diversifiable risk (and hence should not command a premium) if
  - the company has projects is a large number of countries (or)
  - the investors in the company are globally diversified.
  - For Disney, this risk should not affect the cost of capital used. Consequently, we would not adjust the cost of capital for Disney's investments in other mature markets (Germany, UK, France)
- The same diversification argument can also be applied against some political risk, which would mean that it too should not affect the discount rate. However, there are aspects of political risk especially in emerging markets that will be difficult to diversify and may affect the cash flows, by reducing the expected life or cash flows on the project.
- For Disney, this is the risk that we are incorporating into the cost of capital when it invests in Brazil (or any other emerging market)

This will depend upon the company. Smaller companies, with higher insider holdings, should be more likely to assess higher discount rates for expanding overseas. Larger companies, with more diverse stockholdings, should be more inclined to use the same discount rates they use in the domestic market.

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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%

Here is the other half of the equation:

1. The hurdle rate for an investment should reflect its risk. (That is why we use the bottom-up beta that we estimated for theme parks earlier rather than the bottom-up beta for Disney as a company). In addition, the exposure to country risk is incorporated into the investment.
2. We use Disney's theme park debt ratio for this theme park, on the assumption that it is not a stand-alone investment with its own debt capacity. If it were, we would have considered using project specific financing weights. (It is usually not a good idea to compute the cost of capital for a project based on how it is financed, since firms can use disproportionate amounts of debt on some projects not because the projects can afford to carry debt but because they (the firms) have excess debt capacity.

Would lead us to conclude that...

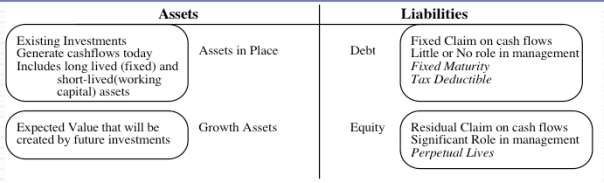
- Do not invest in this park. The return on capital of 4.18% is lower than the cost of capital for theme parks of 8.46%; This would suggest that the project should not be taken.
- Given that we have computed the average over an arbitrary period of 10 years, while the theme park itself would have a life greater than 10 years, would you feel comfortable with this conclusion?
  - Yes
  - No

I would not. I think the accounting return, which cuts off the analysis arbitrarily after 10 years, understates the true return on projects like this one, which have longer expected lives.

In general, while firms claim that using the same life for all projects is not discriminatory, it clearly creates a bias against longer term projects.

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%

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A firm can be viewed as having a portfolio of existing projects. This approach allows you to assess whether that portfolio is earning more than the hurdle rate, but it is based upon the following assumptions:

1. Accounting earnings are a good measure of the earnings from current projects (They might not be, if items like R&D, which are really investments for the future, extraordinary profits or losses, or accounting changes affect the reported income.)
2. The book value of capital is a good measure of what is invested in current projects.

•Some computational details:

Why do we use book value of debt and equity?

Because we want to focus on capital invested in assets in place. Market value has two problems. It includes growth assets and it updates the value to reflect returns earned. In fact, if you computed market value of just assets in place correctly, you should always earn your cost of capital.

Why end of last year?

To stay consistent with end-of-the-year cash flows and earnings that we use in the rest of the analysis. If we used mid-year conventions, we

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
Baidu	17.63%	$30,320	$5,347
Deutsche Bank	NMF	NMF	NMF
Tata Motors	9.55%	$575,983	$55,033
Bookscape	-1.02%	$19,136	-$195

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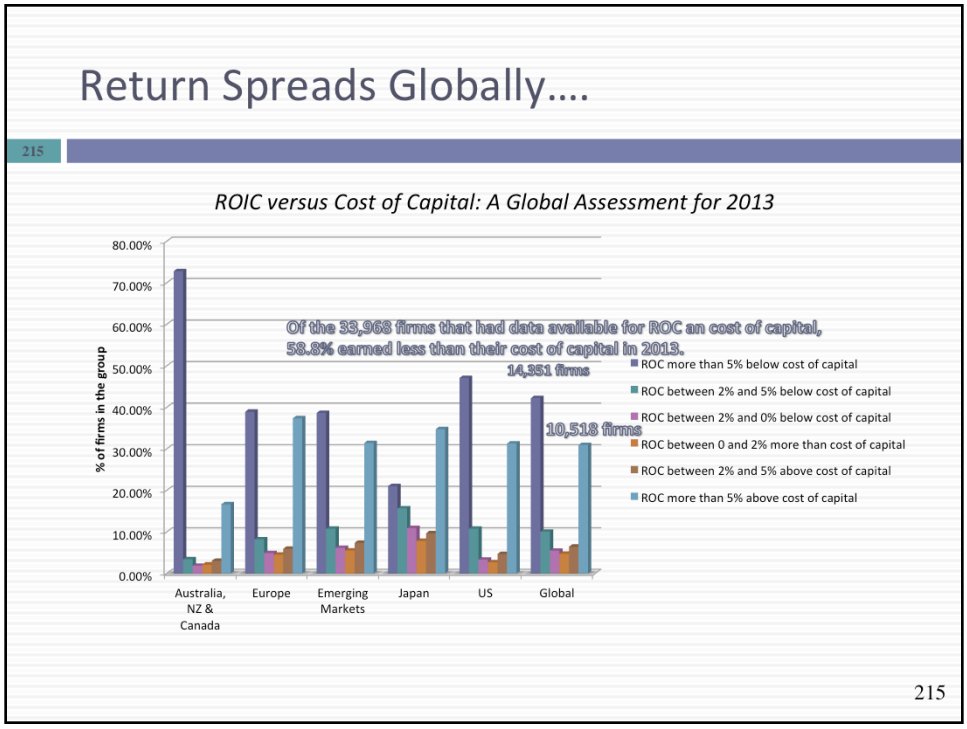
The EVA is a measure of dollar value created in a single time period. Thus, it will be affected by how capital is measured and the ups and downs of year-to-year operating income.

EVA just restates the excess returns (ROC – Cost of capital) in dollar value terms. Thus, it will always have the same sign as the excess return, but it will be larger for larger companies. Thus, you cannot compare the EVA across companies but you can compare the EVA for the same company from year to year.



Looking across all 40,000 firms, you can see that almost a third of all firms earn more than 5% less than their cost of capital. It is true that we are looking at one year's returns, but many of these firms have been earning less than their cost of capital for years.

Implication: A large proportion of all publicly traded firms earn less than their cost of capital on their investments. Some of these firms can attribute their under performance to bad luck or a bad year. A few others may be young firms that have not had a chance to see their investments pay off (yet). However, quite a large percent of these firms have been badly managed and continue to be run by the same managers. If the question is why stockholders have not replaced these managers, the answer lies in the very first section on corporate governance. (If you don't like the way Tata Motors, Baidu or Vale is run, what can you do?)

Application Test: Assessing Investment Quality

- For the most recent period for which you have data, compute the after-tax return on capital earned by your firm, where after-tax return on capital is computed to be
- After-tax ROC = EBIT (1-tax rate)/ (BV of debt + BV of Equity-Cash)previous year
- For the most recent period for which you have data, compute the return spread earned by your firm:
- Return Spread = After-tax ROC - Cost of Capital
- For the most recent period, compute the EVA earned by your firm

  EVA = Return Spread * ((BV of debt + BV of Equity-Cash)previous year

This measure of investment quality is only as good as the measures of operating income and book value that go into it.

Note also that:

1.A negative EVA in a single period should not be taken as an indicator that the company is a bad or poorly managed company. It may reflect the fact that the firm had a bad year or that macro economic variables conspired to reduce operating income in that period (a recession for a cyclical firm, a downturn in commodity prices for a commodity company).

2.Even a string of negative EVAs may not be an indicator of a poorly run firm or business. Young businesses and infrastructure companies often have negative EVAs for extended periods (while they are building up infrastructure) before they turn positive.

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

This converts earnings to cash flows.

Depreciation and amortization are just two of the most common non-cash charges.

Any capital expenditures (whether initial or maintenance) need to be subtracted out.

It is only the change in non-cash working capital that needs to be subtracted out.

The Depreciation Tax Benefit

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- While depreciation reduces taxable income and taxes, it does not reduce the cash flows.
- The benefit of depreciation is therefore the tax benefit. In general, the tax benefit from depreciation can be written as:
- Tax Benefit = Depreciation * Tax Rate
- Disney Theme Park: Depreciation tax savings (Tax rate = 36.1%)

	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

- Proposition 1: The tax benefit from depreciation and other non-cash charges is greater, the higher your tax rate.
- Proposition 2: Non-cash charges that are not tax deductible (such as amortization of goodwill) and thus provide no tax benefits have no effect on cash flows.

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While you subtract depreciation from EBITDA to get to EBIT, and then add it back again to after-tax EBIT, it leaves an imprint on the cash flows, because it reduces taxes. Consequently, if a firm pays no taxes (it is a tax-exempt entity, for instance), there is no benefit to depreciation.

As your tax rates increase, the benefit to depreciation also increases. In the 1970s, when tax rates for wealthy individuals were much higher than tax rates for corporations, the former (who get much higher tax benefits from depreciation) would buy expensive assets (such as airplanes) and lease them back to the latter.

Non-cash charges that are not tax deductible do not create a benefit from a cash flow standpoint. They are subtracted out from after-tax income and then added back. Thus, the debate in acquisitions about whether to use purchase accounting (which leads to goodwill, the amortization of which reduces after-tax earnings in future periods) or pooling (which does not affect earnings) has no implications for cash flows) is really a debate that affects earnings but not cash flows.

Depreciation Methods

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- Broadly categorizing, depreciation methods can be classified as straight line or accelerated methods. In straight line depreciation, the capital expense is spread evenly over time, In accelerated depreciation, the capital expense is depreciated more in earlier years and less in later years. Assume that you made a large investment this year, and that you are choosing between straight line and accelerated depreciation methods. Which will result in higher net income this year?
  - Straight Line Depreciation
  - Accelerated Depreciation
- Which will result in higher cash flows this year?
  - Straight Line Depreciation
  - Accelerated Depreciation

Straight line depreciation will lead to higher income and accelerated depreciation to higher cash flows.

Most US firms use straight line depreciation for financial reporting (as in annual reports) and accelerated depreciation (for tax purposes). This is one reason why effective tax rates in annual reports look low. (Effective Tax Rate = Taxes Paid / Reported Pre-tax Income).

The Capital Expenditures Effect

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- Capital expenditures are not treated as accounting expenses but they do cause cash outflows.
- Capital expenditures can generally be categorized into two groups
  - New (or Growth) capital expenditures are capital expenditures designed to create new assets and future growth
  - Maintenance capital expenditures refer to capital expenditures designed to keep existing assets.
- Both initial and maintenance capital expenditures reduce cash flows
- The need for maintenance capital expenditures will increase with the life of the project. In other words, a 25-year project will require more maintenance capital expenditures than a 2-year project.

While most analysts who look at projects remember to consider the initial capital investment, many of them fail to consider the need for capital maintenance expenditure.

Depreciation and capital expenditures are highly interrelated assumptions. You cannot depreciate what you do not cap ex.

To cap ex or not to cap ex?

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- Assume that you run your own software business, and that you have an expense this year of $ 100 million from producing and distribution promotional CDs in software magazines. Your accountant tells you that you can expense this item or capitalize and depreciate it over three years. Which will have a more positive effect on income?
  - Expense it
  - Capitalize and Depreciate it
- Which will have a more positive effect on cash flows?
  - Expense it
  - Capitalize and Depreciate it

Capitalizing and amortizing the expense will have a more positive effect on income. Assuming you have the income to expense it, expensing it will have a more positive effect on cash flows.

Here are the two times when you may prefer to capitalize and depreciate, rather than expense:

a. When you are losing money and expect to make money in the future (and are worried about losing loss carry forwards)

b. When you expect your tax rates to go up over time.

The Working Capital Effect

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- Intuitively, money invested in inventory or in accounts receivable cannot be used elsewhere. It, thus, represents a drain on cash flows
- To the degree that some of these investments can be financed using supplier credit (accounts payable), the cash flow drain is reduced.
- Investments in working capital are thus cash outflows
  - Any increase in working capital reduces cash flows in that year
  - Any decrease in working capital increases cash flows in that year
- To provide closure, working capital investments need to be salvaged at the end of the project life.
- Proposition 1: The failure to consider working capital in a capital budgeting project will overstate cash flows on that project and make it look more attractive than it really is.
- Proposition 2: Other things held equal, a reduction in working capital requirements will increase the cash flows on all projects for a firm.

By working capital, we consider only non-cash working capital. Defined even more tightly,

Non-cash WC = Inventory + Accounts Receivable - Accounts Payable

Why do we not include cash? Because the investment in working capital is considered to be an investment in wasting assets, i.e., assets on which you cannot make a fair rate of return. To the extent that most US firms that have cash today invest that cash in treasury bills or commercial paper (where they earn a low but a fair rate of return), treating the cash as part of non-cash working capital may be requiring it to earn a return twice.

Some businesses do need to maintain wasting cash balances, i.e., cash in the form of currency but this requirement should be small. If that is the case, that cash can be counted into working capital.

Question to consider: *Can non-cash working capital be a source of cash in some businesses?*

Yes… There are businesses that have little need for inventory and take full advantage of supplier credit, thus making working capital a negative number and a source of cash.

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%

A sunk cost is any cost that has already been incurred and will not be recovered even if the project under consideration is rejected.

The tax savings on the depreciation on the sunk cost is also subtracted out, since that tax savings would accrue to the firm even if it did not take this investment.

Only the after-tax amount of the non-incremental allocated costs are added back because the cash flows are after-tax cash flows.

Alternatively, the cash flows can be estimated from scratch using only the incremental cash flows.

A more direct way of getting to incremental cash flows

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	0	1	2	3	4	5	6	7	8	9	10
Revenues		$0	$1,250	$1,750	$2,500	$3,125	$3,438	$3,781	$4,159	$4,575	$4,667
Direct Expenses		$0	$788	$1,103	$1,575	$1,969	$2,166	$2,382	$2,620	$2,882	$2,940
Incremental Depreciation		$0	$375	$419	$394	$322	$317	$314	$314	$316	$318
Incremental G&A		$0	$63	$88	$125	$156	$172	$189	$208	$229	$233
Incremental Operating Income		$0	$25	$141	$406	$678	$783	$896	$1,017	$1,148	$1,175
- Taxes		$0	$9	$51	$147	$245	$283	$323	$367	$415	$424
Incremental after-tax Operating income		$0	$16	$90	$260	$433	$500	$572	$650	$734	$751
+ Incremental Depreciation		$0	$375	$419	$394	$322	$317	$314	$314	$316	$318
- Capital Expenditures	$2,000	$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	($2,000)	($1,000)	($859)	($267)	$340	$466	$516	$555	$615	$681	$715

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Rather than start with accounting earnings and work backwards to get to incremental cash flows, we could just incremental revenues and expenses all the way through and save ourselves the trouble. The answers should match up.

Sunk Costs

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- What is a sunk cost? Any expenditure that has already been incurred, and cannot be recovered (even if a project is rejected) is called a sunk cost. A test market for a consumer product and R&D expenses for a drug (for a pharmaceutical company) would be good examples.
- The sunk cost rule: When analyzing a project, sunk costs should not be considered since they are not incremental.
- *A Behavioral Aside: It is a well established finding in psychological and behavioral research that managers find it almost impossible to ignore sunk costs.*

Sunk costs should not be considered an investment analysis. After all, rejecting an investment that adds value is self-defeating even if the value added < Sunk costs….

It is human nature, though, to try to make back what has already been lost. It is what keeps casinos going…

In what is known as the Concorde fallacy, managers were presented with a hypothetical scenario. Assume that you have spent $ 9 million, developing a new technology, and that you will need to spend an additional million to complete your development. Assume now that a competitor has just come up with a much better technology (that will make yours obsolete). The subjects of this experiment were asked to decide whether they would invest the extra million, in light of this new information.

a.When managers were just asked about investing an extra million in a technology that would be obsolete when it came out (and not told about the $ 9 million already spent) they all rejected the investment.

b.When made aware of what had already been spent, 40% chose to make the additional investment.

Test Marketing and R&D: The Quandary of Sunk Costs

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- A consumer product company has spent $ 100 million on test marketing. Looking at only the incremental cash flows (and ignoring the test marketing), the project looks like it will create $25 million in value for the company. Should it take the investment?
  - Yes
  - No
- Now assume that every investment that this company has shares the same characteristics (Sunk costs > Value Added). The firm will clearly not be able to survive. What is the solution to this problem?

Companies with substantial test marketing and R&D expenses have to put into place processes where these costs are assessed before they occur since it is too late to do it afterwards. These assessments will be based upon fairly primitive information but they are necessary. For instance, proposals for basic research will have to include probabilities that the research will lead to commercial products and the potential markets for such products.

Allocated Costs

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- Firms allocate costs to individual projects from a centralized pool (such as general and administrative expenses) based upon some characteristic of the project (sales is a common choice, as is earnings)
- For large firms, these allocated costs can be significant and result in the rejection of projects
- To the degree that these costs are not incremental (and would exist anyway), this makes the firm worse off. Thus, it is only the incremental component of allocated costs that should show up in project analysis.

Allocation is the accountant's mechanism for fairness.

If the allocation is of an expense that would be incurred anyway, whether the project is taken or not, it is not incremental.

It is difficult to figure out what allocated expenses are fixed and what are incremental. One approach that works reasonably well for firms with a history is to look at the expense (say, G&A) over time and compare it with some base variable (revenues or number of units). If the expense is fixed, it should not vary with the base variable. If it is variable, it will, and the nature of the variation will help define how much is fixed and how much is variable.

Breaking out G&A Costs into fixed and variable components: A simple example

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- Assume that you have a time series of revenues and G&A costs for a company.

Year	Revenues	G&A Costs
1	$1,000	$250
2	$1,200	$270
3	$1,500	$300

  - What percentage of the G&A cost is variable?

If the pattern of this three year period tells the whole story,roughly 40% of the G&A cost is variable. Note that the incremental G&A/incremental revenues was 10% in both years 2 and 3. Using this 10% on total revenue in year 1 yields the variable G&A cost of $100 million in year 1 which is 40% of the total G&A costs.

In the real world, it is likely that this relationship will be far more jagged. You will need more data and your estimates will have more error. One way to estimate the variable G&A costs as a proportion of revenues, if you have a long time series of data, is to run a regression of G&A Costs against revenues:

G&A = a + b Revenues

The coefficient on revenue should provide a measure of how much G&A cots increase for every dollar increase in revenue.

To Time-Weighted Cash Flows

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

Cash flows across time cannot be compared. Discounting brings cash flows back to the same point in time.

The present value factors are in a sense time-weighing factors. The riskier a cash flow and the further it is in the future, the lower the weight you attach to that cash flow.

Present Value Mechanics

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Cash Flow Type	Discounting Formula	Compounding Formula
1. Simple CF	$CF_n / (1+r)^n$	$CF_0 (1+r)^n$
2. Annuity	$A\left[\frac{1 - \frac{1}{(1+r)^n}}{r}\right]$	$A\left[\frac{(1+r)^n - 1}{r}\right]$
3. Growing Annuity	$A(1+g)\left[\frac{1 - \frac{(1+g)^n}{(1+r)^n}}{r-g}\right]$	
4. Perpetuity	A/r	
5. Growing Perpetuity	Expected Cashflow next year/(r-g)	

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These are the basic present value formulae. All except the growing annuity, can be done using the PV key on any financial calculator.

These formulae are based upon the assumptions that cash flows occur at the end of each period. If cash flows occur at the end of each period, the equations can be modified by multiplying each one by (1+r) to get end-of-the-period equivalents.

Discounted cash flow measures of return

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- Net Present Value (NPV): The net present value is the sum of the present values of all cash flows from the project (including initial investment).
  - NPV = Sum of the present values of all cash flows on the project, including the initial investment, with the cash flows being discounted at the appropriate hurdle rate (cost of capital, if cash flow is cash flow to the firm, and cost of equity, if cash flow is to equity investors)
  - Decision Rule: Accept if NPV > 0
- Internal Rate of Return (IRR): The internal rate of return is the discount rate that sets the net present value equal to zero. It is the percentage rate of return, based upon incremental time-weighted cash flows.
  - Decision Rule: Accept if IRR > hurdle rate

The key difference between these approaches is that Net Present Value is a dollar measure, and it measures surplus value created. Thus, even a small net present value is over and above your hurdle rate.

Internal rate of return is a percentage measure of total return (not excess return). It is only when it is compared to the hurdle rate that is provides a measure of excess return (in percentage terms)

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

When you stop estimating cash flows on a project, you have to either estimate salvage value or terminal value. For projects with finite lives (such as buying a plant or equipment), estimating salvage value is appropriate. For projects with very long lives, estimating a terminal value is more reasonable.

If you assume that the project is liquidated, any investments in working capital have to be salvaged. This does not necessarily mean that you will get 100% back.

A terminal value can also be thought off as the value that you would get by selling this project (as an on-going project) to someone else at the end of the analysis. In this case, we are estimating that the theme park in Bangkok will be worth $ 11,275 million at the end of year 10. (The perpetual growth model gives the value of the asset at the beginning of the year of the cash flow. We used year 11 cash flows in the numerator and have the terminal value as of the start of year 11, which is also the end of year 10)

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%

This is the net present value calculation using the cost of capital of 8.46%, the theme park cost of capital adjusted for emerging market risk in Brazil.

Which makes the argument that..

- The project should be accepted. The positive net present value suggests that the project will add value to the firm, and earn a return in excess of the cost of capital.
- By taking the project, Disney will increase its value as a firm by $3,296 million.

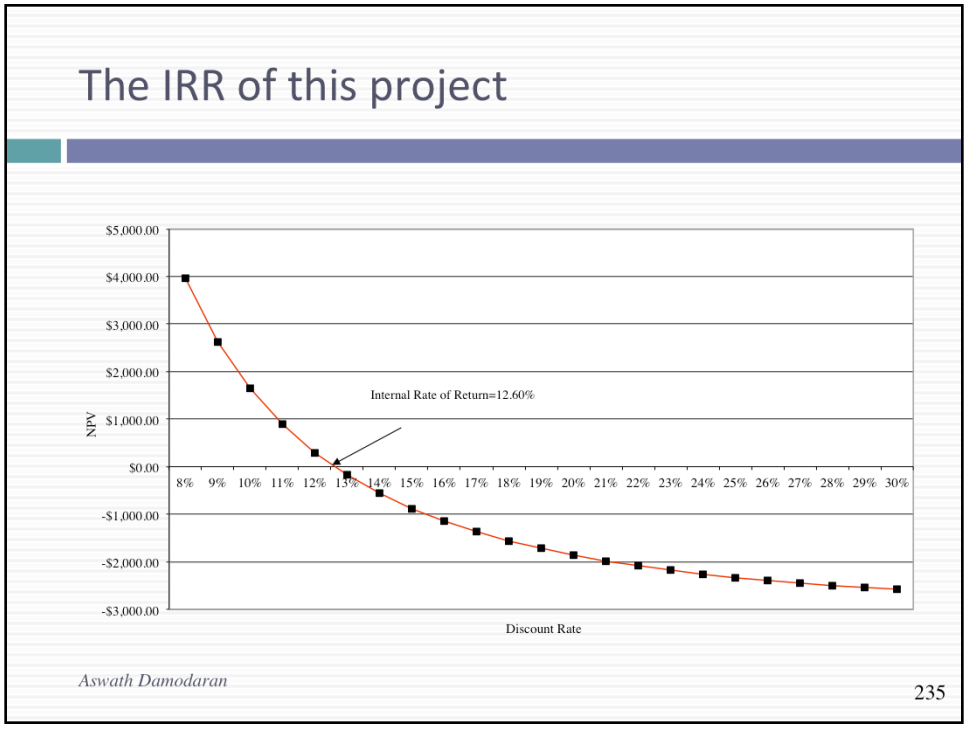
The net present value calculation suggests that this project is a good one.

The increase in firm value will not necessarily translate into an increase in market value, since market values reflect expectations. If expectations were such that the market expected Disney to take large positive NPV projects, the $3,296 million will have to be measured against these expectations.

The additive nature of NPV is useful in a variety of contexts:

a.The value of a business that is composed of many projects can be written as the sum of the NPVs of the projects.

b.When a firm over pays on an acquisition, it is the equivalent of accepting a negative NPV investment, and the value of its equity should drop by the overpayment.



This is a net present value profile, where NPV is plotted against discount rates. The IRR is that discount rate at which NPV is zero.

The steepness of the slope tells us something about how sensitive this investment is to changes in the discount rate. It is the equivalent of the duration of a bond, which tells you how sensitive bond prices are to changes in interest rates.

Notice that the NPV is much more sensitive to changes in discount rates, when discount rates are low, than when they are high. (This may have consequences for how value will change in low interest rate scenarios as opposed to high interest rate ones).

The IRR suggests..

- The project is a good one. Using time-weighted, incremental cash flows, this project provides a return of 12.60%. This is greater than the cost of capital of 8.46%.
- The IRR and the NPV will yield similar results most of the time, though there are differences between the two approaches that may cause project rankings to vary depending upon the approach used. They can yield different results, especially why comparing across projects because
  - A project can have only one NPV, whereas it can have more than one IRR.
  - The NPV is a dollar surplus value, whereas the IRR is a percentage measure of return. The NPV is therefore likely to be larger for "large scale" projects, while the IRR is higher for "small-scale" projects.
  - The NPV assumes that intermediate cash flows get reinvested at the "hurdle rate", which is based upon what you can make on investments of comparable risk, while the IRR assumes that intermediate cash flows get reinvested at the "IRR".

The information needed to use IRR in investment analysis is the same as the information need to use NPV.

If the hurdle rate is changing over time, IRR becomes more complicated to use. It has to be compared to the geometric average of the hurdle rates over time.

Does the currency matter?

- The analysis was done in dollars. Would the conclusions have been any different if we had done the analysis in Brazilian Reais?
  a. Yes
  b. No

No. It should not. A good project should be good in any currency. But showing this in practice requires us to make some key assumptions about how exchange rates will evolve over time.

The ‘‘Consistency Rule” for Cash Flows

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- The cash flows on a project and the discount rate used should be defined in the same terms.
  - If cash flows are in dollars (R$), the discount rate has to be a dollar (R$) discount rate
  - If the cash flows are nominal (real), the discount rate has to be nominal (real).
- If consistency is maintained, the project conclusions should be identical, no matter what cash flows are used.

When working with higher inflation currencies, the discount rates will be higher but so will the expected growth (because of the inflation)

We are implicitly assuming that current exchange rates are correct and that expected changes in exchange rates over time will reflect differences in inflation. To the degree that this is not true, the project analysis might be affected by the currency in which the analysis is done.

Disney Theme Park: Project Analysis in R$

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- The inflation rates were assumed to be 9% in Brazil and 2% in the United States. The R$/dollar rate at the time of the analysis was 2.35 R$/dollar.
- The expected exchange rate was derived assuming purchasing power parity.
  - Expected Exchange Rate$_t$ = Exchange Rate today * $(1.09/1.02)^t$
- The expected growth rate after year 10 is still expected to be the inflation rate, but it is the 9% R$ inflation rate.
- The cost of capital in R$ was derived from the cost of capital in dollars and the differences in inflation rates:

$$\text{R\$ Cost of Capital} = (1+\text{US \$ Cost of Capital})\frac{(1+\text{Exp Inflation}_{\text{Brazil}})}{(1+\text{Exp Inflation}_{\text{US}})} - 1$$

$$= (1.0846)\ (1.09/1.02) - 1 = 15.91\%$$

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Note that the expected exchange rate reflects purchasing power parity.

Many companies in Asia, during the early 1990s used the then prevailing exchange rate to forecast future cash flows, because governments in these markets had pegged their currencies to the dollar (essentially promising a fixed exchange rate). While this held up for a while, the differences in inflation eventually caused the local currency to collapse, taking many real projects down with it.

Disney Theme Park: R$ NPV

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

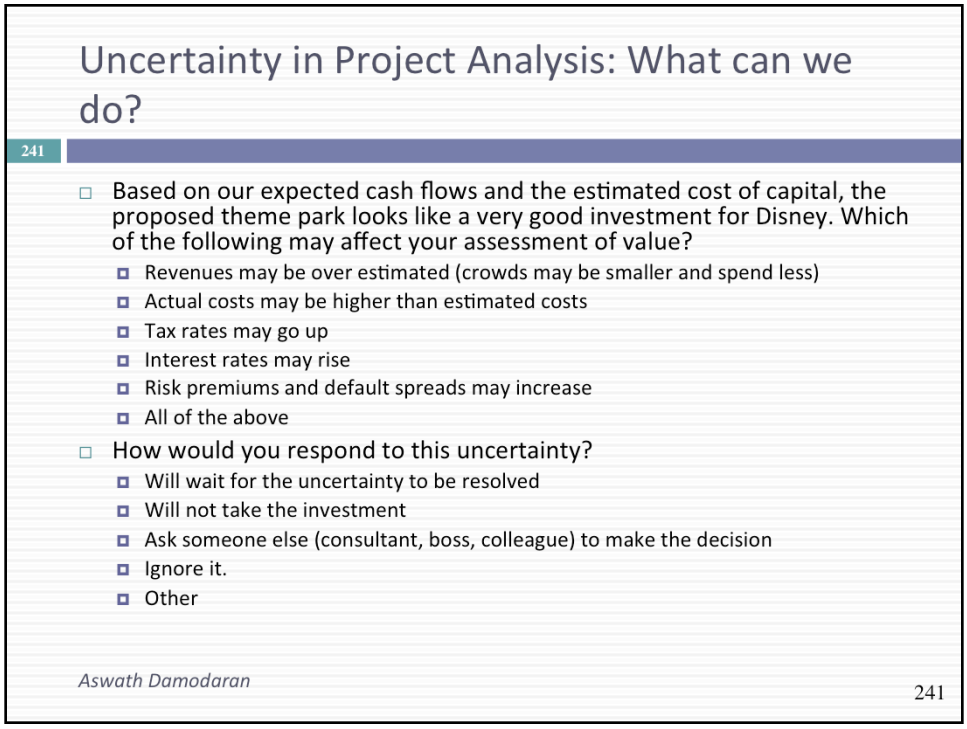
Discount at R$ cost of capital = (1.0846) (1.09/1.02) – 1 = 15.91%

Year	Cashflow ($)	$R/$	Cashflow (Bt)	Present Value
0	-R$ 2,000	R$ 2.35	-R$ 4,700	-R$ 4,700
1	-R$ 1,000	R$ 2.51	-R$ 2,511	-R$ 2,167
2	-R$ 859	R$ 2.68	-R$ 2,305	-R$ 1,716
3	-R$ 267	R$ 2.87	-R$ 767	-R$ 492
4	R$ 340	R$ 3.06	R$ 1,043	R$ 578
5	R$ 466	R$ 3.27	R$ 1,527	R$ 730
6	R$ 516	R$ 3.50	R$ 1,807	R$ 745
7	R$ 555	R$ 3.74	R$ 2,076	R$ 739
8	R$ 615	R$ 4.00	R$ 2,458	R$ 754
9	R$ 681	R$ 4.27	R$ 2,910	R$ 771
10	R$ 11,990	R$ 4.56	R$ 54,720	R$ 12,504
				R$ 7,745

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

The NPV is identical because what we lose by using a higher discount rate is exactly offset by what we gain in growth in the cash flows.

If you are not consistent about estimating the cash flows and the discount rates, the net present values may deviate but only because you have brought your point of view on the currency into the analysis.



All of the above will affect the actual value of the project. However, note that if your estimates are unbiased, there should be almost a good a chance that the outcome will be better than expected rather than worse than expected.

The uncertainty will never be resolved (new uncertainties will creep up) and if you do wait, you will never invest. The only two choices are to ignore it, arguing that the discount rate already reflects your uncertainty or to try to at least get a better handle on uncertainty before you make your final decision.

One simplistic solution: See how quickly you can get your money back…

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

Year	Cash Flow	Cumulated CF	PV of Cash Flow	Cumulated DCF
0	-$2,000	-$2,000	-$2,000	-$2,000
1	-$1,000	-$3,000	-$922	-$2,922
2	-$859	-$3,859	-$730	-$3,652
3	-$267	-$4,126	-$210	-$3,862
4	$340	-$3,786	$246	-$3,616
5	$466	-$3,320	$311	-$3,305
6	$516	-$2,803	$317	-$2,988
7	$555	-$2,248	$314	-$2,674
8	$615	-$1,633	$321	-$2,353
9	$681	-$952	$328	-$2,025
10	$715	-$237	$317	-$1,708
11	$729	$491	$298	-$1,409
12	$743	$1,235	$280	-$1,129
13	$758	$1,993	$264	-$865
14	$773	$2,766	$248	-$617
15	$789	$3,555	$233	-$384
16	$805	$4,360	$219	-$165
17	$821	$5,181	$206	$41

Payback = 10.3 years

Discounted Payback = 16.8 years

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There are some decision makers who use payback as a decision rule. In other words, any investment that pays off in less than X years is a good investment. That strikes us as dangerous for many reasons. Payback asks and answers a very narrow question, which is when you make your initial investment back. Once that happens, we lose interest in the project, no matter how large or small the cash flows are after that.

Payback does offer more promise as a risk measure, especially in long term projects where you are concerned about whether the project will last as long as you thought and the cash flows in the later years. In more practical terms, you may accept only those investments that have positive NPV and pay off in less than X years.

A slightly more sophisticated approach: Sensitivity Analysis & What-if Questions…

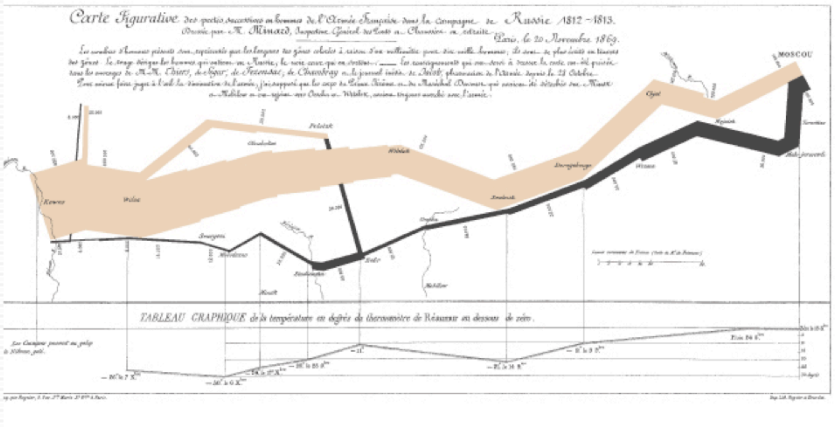
- The NPV, IRR and accounting returns for an investment will change as we change the values that we use for different variables.
- One way of analyzing uncertainty is to check to see how sensitive the decision measure (NPV, IRR..) is to changes in key assumptions. While this has become easier and easier 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).

It is natural to ask what-if questions about a project once an analysis is complete.

Given how easy it is today to do sensitivity analysis, it is important that we focus only on the most important variables. Doing sensitivity analysis on too many minor variables may draw attention away from the key factors underlying the conclusion.

It is probably a good idea to also focus on variables where you have some effect over the outcome. Thus, asking what will happen if competition increases and margins shrink is useful, since you may be able to increase advertising and fight off the competition but working out what will happen if the economy goes into a recession will yield little of value (unless it affects how much you borrow to fund the investment.)

And here is a really good picture…

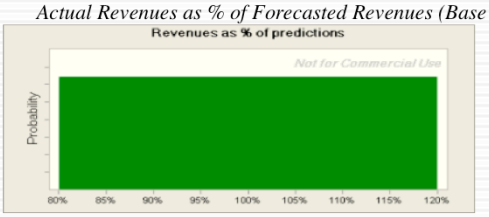


A good way to show the effects of sensitivity analysis is with a graph and a good graph tells a story. This is one of my all-time favorites, from a book on charting by Edward Tufte (The Visual Display of Information)…

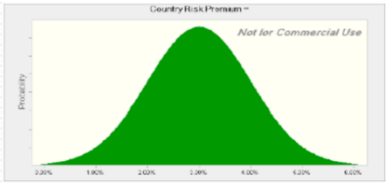
This graph shows the size of Napoleon's army on his ill-fated attempt to invade Russia on one axis and the temperature on the other. It tells the story without any text… Note that the army shrinks on its way back from Moscow as temperatures drop below freezing.

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

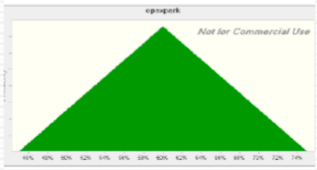
Actual Revenues as % of Forecasted Revenues (Base case = 100%)



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



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



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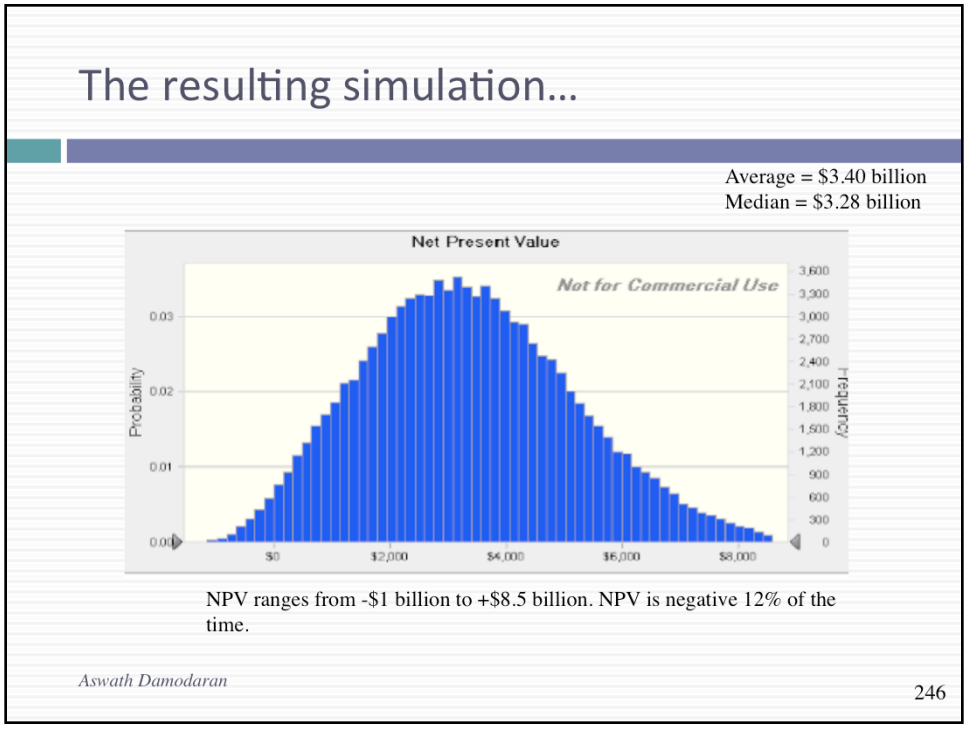
The key to doing simulations is

a.Picking the variables that you want to use probability distributions for (Hint: Don't pick every input. Choose only the key inputs)

b.Choosing the type of distribution to use for each input (Review your probability distributions... And the paper I have on my site on how to pick the right one)

c.Estimating the parameters of the distribution (Use both historical and industry wide data…)



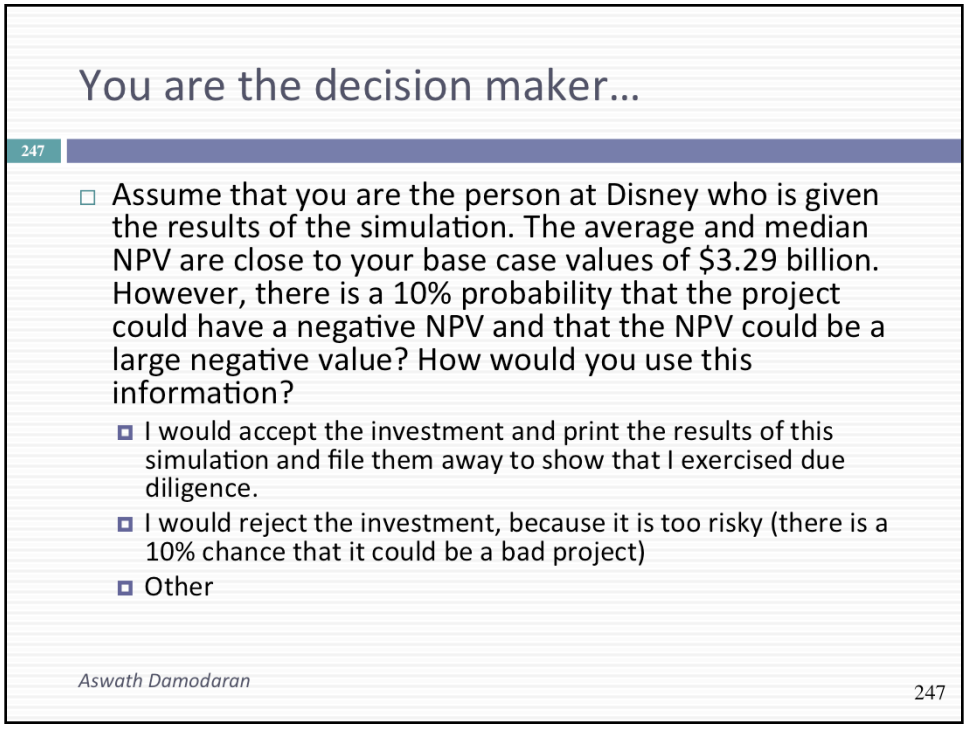
This is the output from 100,000 simulations. I used Crystal Ball.

The average should be close to your base case value, though it will not be identical because of the distributional assumptions. The key issues are the spread in the distribution and the probability that the number is a negative value…. You also have the best and worst case scenarios embedded in the distribution.

Here are some questions that you can answer:

1. What is the likelihood that this is a bad investment? (A little less than 10%)
2. What are your best case and worst case scenarios? (About $8.5 billion and -$1 billion)

If you are planning on using risk hedging, you can see the effect on the distribution.



Not a. If the purpose of the analysts is to provide cover to decision makers, it does not add any real value to the firm. (It does to the decision maker)

Not b. Seems to be double counting. After all, we have captured the risk in the discount rate already….. If a firm is not diversified or in danger of default, though, it may make sense to alter your decision to reflect the results from the simulation.

I would actually choose c. I would accept this investment, but use the results of the simulation to guide how I manage the project in the aftermath. Thus, if the variability in the NPV is coming primarily from a macro variable (say the cost of a commodity), I would consider hedging that risk. If it is coming from labor costs, I would try to negotiate a long term contract with my workers to stabilize costs.

Equity Analysis: The Parallels

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- 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

The Disney analysis was an analysis from the perspective of the entire firm (and not just its equity investors), looking at cash flows to all claimholders, the cost of capital and returns on capital. Note that while we borrowed money, we did not consider any of the cash flows associated with borrowing. The earnings were before interest expenses and the cash flows were before debt repayments.

The analysis could have been done entirely in terms of cash flows and returns to equity investors in the business.

A Vale Iron Ore Mine in Canada Investment Operating Assumptions

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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.

This project differs from the Disney analysis on two dimensions:

The investment is a finite life investment

The analysis will be done in equity terms.

Financing Assumptions

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Vale plans to borrow $0.5 billion at its current US$ 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 mine will be partly funded with debt, which will be paid off in equal annual installments. However, the composition of these payments will change over time.

Start by estimating the annual payment, using the loan amount of $50 million and the US $ interest rate of 4.05%, with a ten-year maturity. Then, break the payment down by year into interest and principal. If you do it right, there should be no principal left at the end of the 10th year.

The Hurdle Rate

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- 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%

Everything is done in US dollar and equity terms.

Note that we are using the levered beta for just the iron ore business and not Vale as a whole

Net Income: Vale Iron Ore Mine

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	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

The mine takes a little while to transition to full production and the price per ton rises at 2% (inflation rate) every year.

The depreciation is 20% of the remaining depreciable value until you get to year 6, when the straight line depreciation exceeds it and we switch to it.

A ROE Analysis

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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%

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The return on equity is computed by dividing the net income by the average book value of equity. Note the increase in return on equity as you move through to the later years (income rises as depreciation falls, and the book value of the equity investment becomes smaller because of the depreciation)

The fact that this is a finite life project allows us to get away with no small capital maintenance expenditure.

From Project ROE to Firm ROE

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- As with the earlier analysis, where we used return on capital and cost of capital to measure the overall quality of projects at firms, we can compute return on equity and cost of equity to pass judgment on whether firms are creating value to its equity investors.
- Specifically, we can compute the return on equity (net income as a percentage of book equity) and compare to the cost of equity. The return spread is then:
  - Equity Return Spread = Return on Equity – Cost of equity
- This measure is particularly useful for financial service firms, where capital, return on capital and cost of capital are difficult measures to nail down.
- For non-financial service firms, it provides a secondary (albeit a more volatile measure of performance). While it usually provides the same general result that the excess return computed from return on capital, there can be cases where the two measures diverge.

Equity return spreads diverge (in direction) from capital return spreads, when the book interest rate on debt diverges from the market interest rate (if the book interest rate is much lower than the market interest rate, the capital return spread can be be negative & the equity return spread can be positive) and or when there are other non-operating sources of income (that are not captured in operating income but become part of net income).

An Incremental CF Analysis

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	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

This converts the equity earnings on the previous page into cash flows to equity. Note that we reduce the initial investment by the new debt (since it reduces the equity investment needed). The salvage value is shown in the final year.

The US$ cash flows to equity are discounted at the US$ cost of equity to arrive at a NPV (which should be the same in real and nominal terms)

FCFE : Free Cash Flow to Equity. This measures the cash flow left over for equity investors after all needs on this project are met, including debt payments and capital expenditures.

An Equity NPV

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

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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

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The caswhflows to equity are US $ cashflows and are discounted back at the US $ cost of equity for the iron ore business.

An Equity IRR

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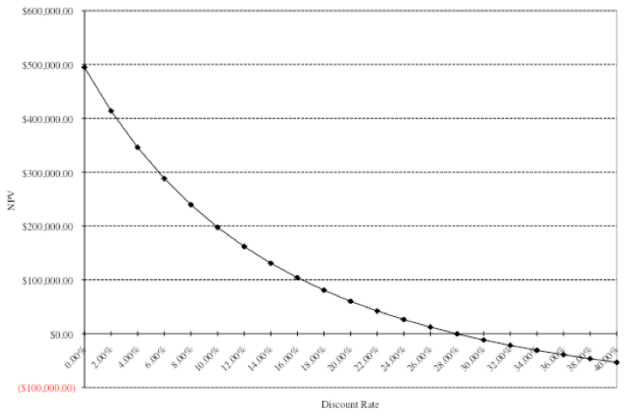
Figure 5.6: NPV Profile on Equity Investment in Paper Plant: Aracruz



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The IRR for this project, using US $ equity cashflows, is 28%, higher than the cost of equity of 11.13%.

Real versus Nominal Analysis

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In computing the NPV of the plant, we estimated US $ cash flows and discounted them at the US $ cost of equity. We could have estimated the cash flows in real terms (with no inflation) and discounted them at a real cost of equity. Would the answer be different?

- Yes
- No
- Explain

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If we remain consistent about using the same expected inflation to deflate the cash flows and adjust the cost of equity downwards, there should be no effect on value.

Dealing with Macro Uncertainty: The Effect of Iron Ore Price

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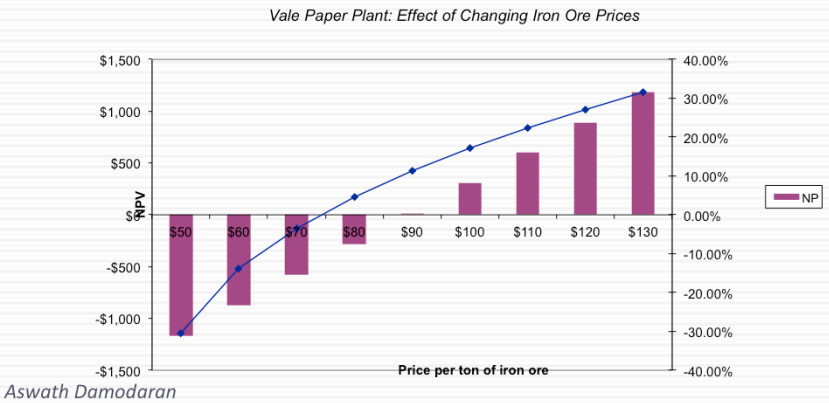
- Like the Disney Theme Park, the Vale Iron Ore Mine's actual value will be buffeted as the variables change. The biggest source of variability is an external factor –the price of iron ore.



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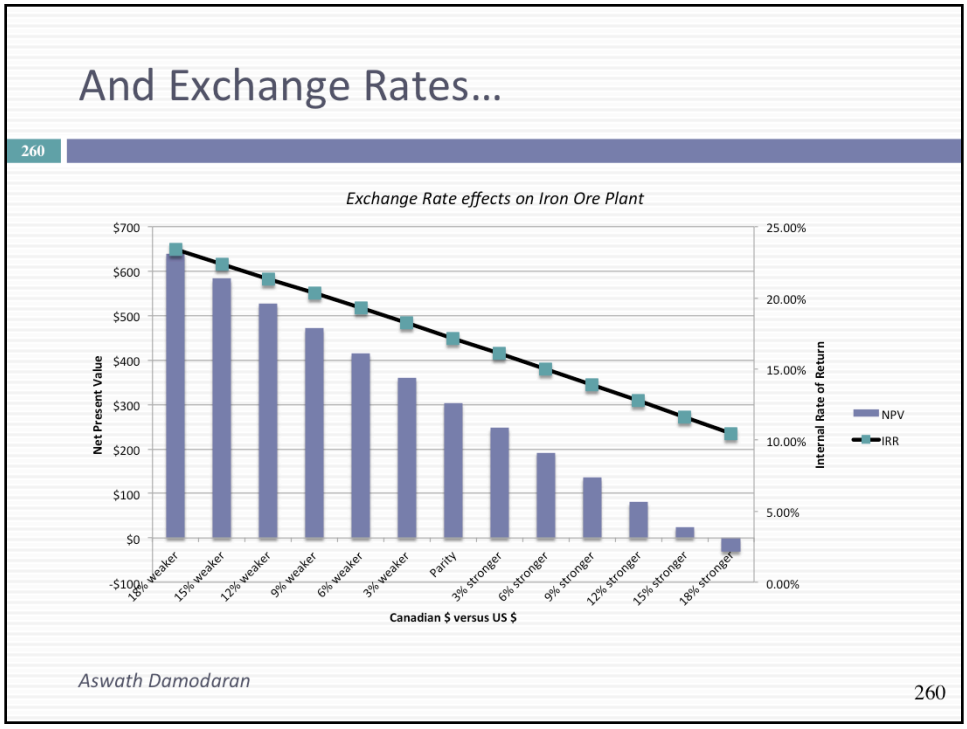
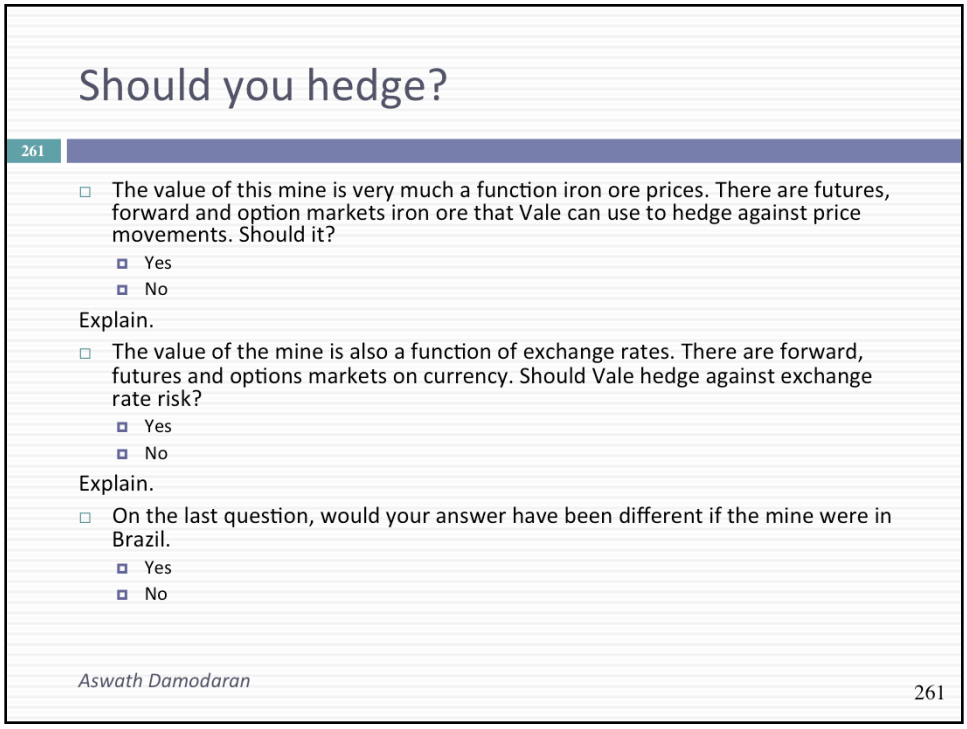
The breakeven price is about $75/ton. If iron ore prices drop below that level, the mine becomes non-viable.

A key difference between breakeven analysis and simulation is that you can change only on variable at a time in breakeven analysis, while holding all else constant…. To the extent that the other variables (other than revenues) are affected by iron ore prices I may get a poor measure of the effect on NPV of changing ore prices.



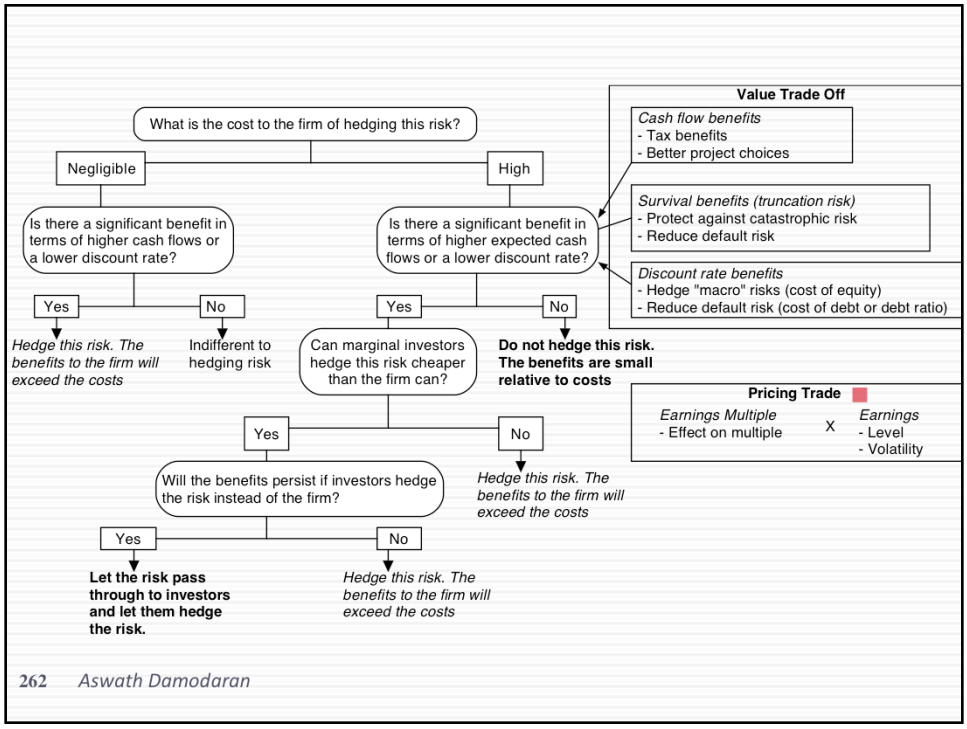
The mine will be in Canada, with the costs in Canadian dollars, and the revenues will be in US $, creating an exchange rate risk exposure.



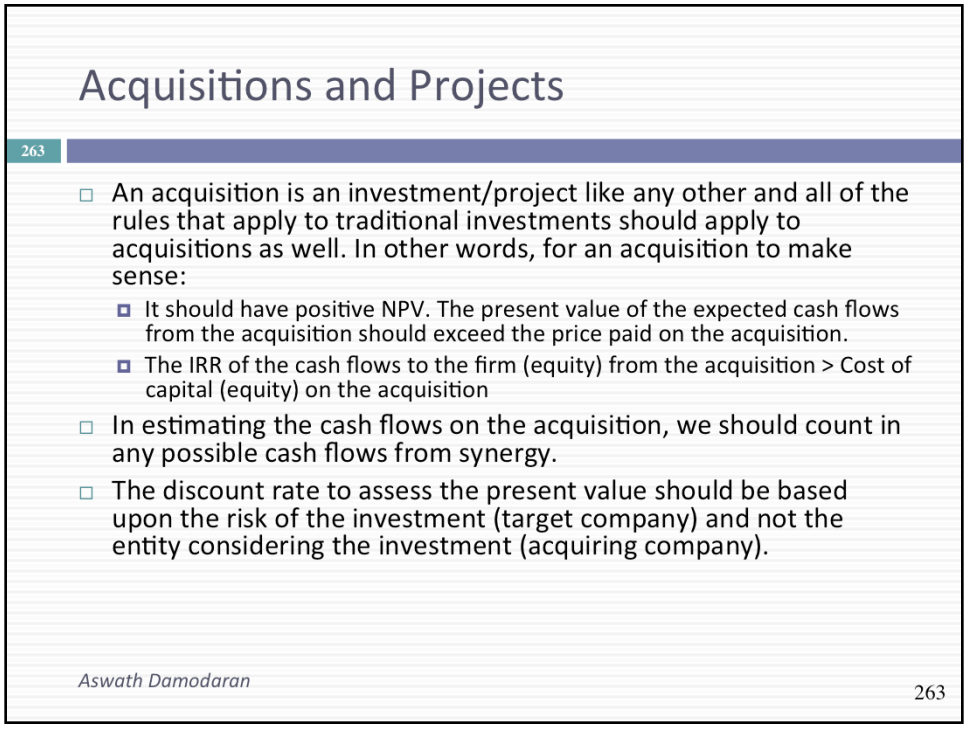
Vale is not unique in this respect. All commodity companies are exposed to commodity price risk. However, here is the catch. Many investors in these companies invest in them because they want to play the commodity price game. Thus, investors who believe that oil prices will go up often buy oil companies. If these companies then hedge against oil price variability, they are undercutting that rationale. On an empirical basis, there have been studies that have compared commodity prices that hedge against commodity price movements against companies that do not, as investments. The general consensus seems to be that companies that do not hedge are much better investments, even on a risk adjusted basis, than companies that do.

Here are the possible exceptions. A commodity company that prides itself on its operating prowess may choose to isolate that strength by hedging against commodity price risk. Thus, an oil company that is consistently more efficient about finding and exploiting new oil reserves may hedge against oil price to show the market its strength.

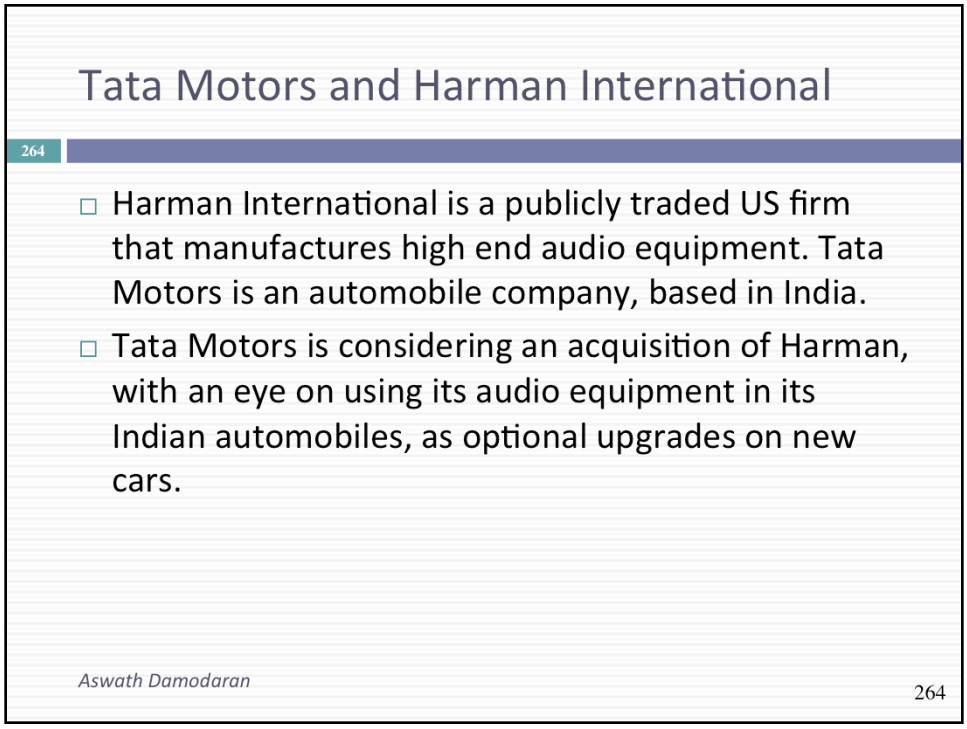
On exchange rates, the answer is more nuanced. Investors do not buy Vale to bet on exchange rates. To the extent that Vale's managers feel that their competitive advantage is in the mining business and not in forecasting exchange rates, there is an argument to be made that hedging against exchange rate risk is not expensive and can allow managers to focus on what matters. (This may also explain why airlines like Southwest and Singapore Airlines



Whether you should hedge a risk or not depends on who you are, who your investors are, what risk you are considering, how transparent that risk is and how costly it is to hedge. No one answer fits all firms, and even for the same firm, across different types of risk.



All too often, firms seem to use different and often far looser rules to assess acquisitions than they do traditional investments. In many cases, acquisitions are justified, even when the make no financial sense, using fuzzy words such as strategic considerations and synergy. We are not denying that these considerations exist but we would argue that we these words have to be converted into expected cash flows (uncertain though we might be) and assess these cash flows exactly the same way that we assess all other cash flows.



Harman is in a very different business, country and currency than Tata Motors. We have to take all of those differences into account in assessing the value of Harman.

Estimating the Cost of Capital for the Acquisition (no synergy)

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1. Currency: Estimated in US $, since cash flows will be estimated in US $.
2. Beta: Harman International is an electronic company and we use the unlevered beta (1.17) of electronics companies in the US.
3. Equity Risk Premium: Computed based on Harman's operating exposure:

	Revenues: 2012-13 (in millions)	ERP	Weight	Weight *ERP
United States	$1,181	5.50%	27.48%	1.51%
Germany	$1,482	5.50%	34.48%	1.90%
Rest of Europe	$819	7.02%	19.06%	1.34%
Asia	$816	7.27%	18.99%	1.38%
Harman	*$4,298*		*100.00%*	*6.13%*

4. Debt ratio & cost of debt: Tata Motors plans to assume the existing debt of Harman International and to preserve Harman's existing debt ratio. Harman currently has a debt (including lease commitments) to capital ratio of 7.39% (translating into a debt to equity ratio of 7.98%) and faces a pre-tax cost of debt of 4.75% (based on its BBB- rating).

Levered Beta = 1.17 (1+ (1-.40) (.0798)) = 1.226

Cost of Equity= 2.75% + 1.226 (6.13%) = 10.26%

Cost of Capital = 10.26% (1-.0739) + 4.75% (1-.40) (.0739) = 9.71%

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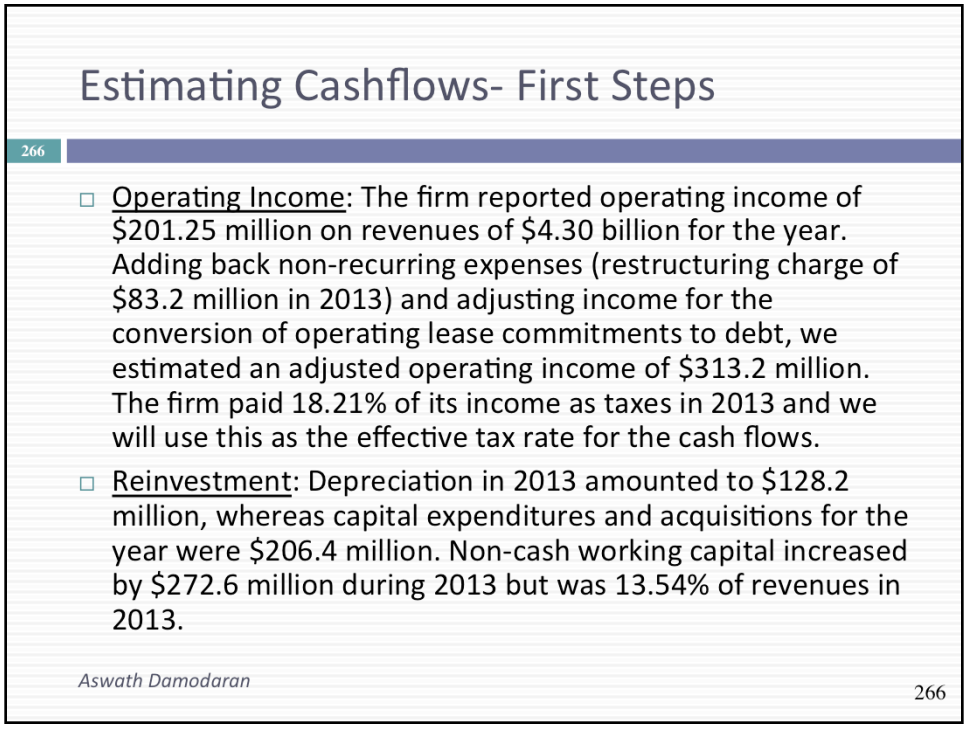
Note that the discount rate is assessed in dollars because all of the cash flows will be estimated in dollars.

To compute the cost of capital, we use Harman-specific numbers rather than the numbers from Tata Motors. The only inputs where there could have been some variation are in the debt ratio and cost of debt. If Tata Motors had been under levered (had too little debt) or over levered (too much debt), a case can be made for replacing the current debt ratio and cost of debt with the optimal. Again, this would have nothing to do with Tata Motors capacity to borrow money…



Here is the lease conversion details. The present value of lease commitments over the next 7 years, discounted back at Harman's pre-tax cost of debt of 4.75% is $143.95 million. We added back the operating lease expense from 2013 ($49.3 million) and subtracted out an estimated depreciation of $20.6 million to arrive at the adjusted value:

Adjusted Operating Income = 201.25+ 83.2 + (49.3-20.6) = $313.2

Bringing in growth

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- We will assume that Harman International is a mature firm, growing 2.75% in perpetuity.
- We assume that revenues, operating income, capital expenditures and depreciation will all grow 2.75% for the year and that the non-cash working capital remain 13.54% of revenues in future periods.

	2013	2014
Revenues	$4,297.80	$4,415.99
Operating income	$313.19	$321.80
Tax rate	18.21%	18.21%
After-tax Operating income	$256.16	$263.21
+ Depreciation	$128.20	$131.73
- Capital Expenditures	$206.40	$212.08
- Change in non-cash WC	$272.60	$16.01
Cash flow to the firm	-$94.64	$166.85

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We are normalizing working capital changes because they are so volatile. We will be using $166.85 million as the expected cash flows for 2014.

Value of Harman International: Before Synergy

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- Earlier, we estimated the cost of capital of 9.67% as the right discount rate to apply in valuing Harman International and the cash flow to the firm of $166.85 million for 2014 (next year), assuming a 2.75% growth rate in revenues, operating income, depreciation, capital expenditures and total non-cash working capital. We also assumed that these cash flows would continue to grow 2.75% a year in perpetuity.

$$\text{Value of Operating Assets} = \frac{\text{Expected Cashflow to the firm next year}}{\text{(Cost of Capital - Stable growth rate)}}$$

$$= \frac{\$166.85}{(.0971 - .0275)} = \$2,462 \text{ million}$$

- Adding the cash balance of the firm ($515 million) and subtracting out the existing debt ($313 million, including the debt value of leases) yields the value of equity in the firm:
- Value of Equity = Value of Operating Assets + Cash – Debt

  = $2,462 + $ 515 - $313 million = $2,664 million
- The market value of equity in Harman in November 2013 was $5,428 million.
- To the extent that Tata Motors pays the market price, it will have to generate benefits from synergy that exceed $2764 million.

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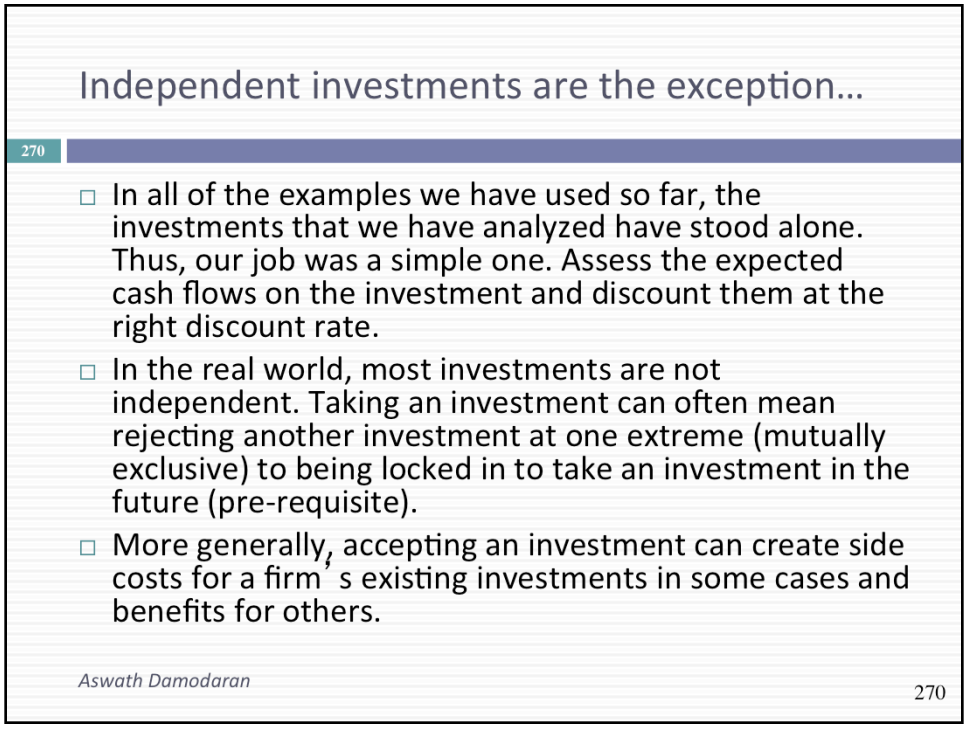
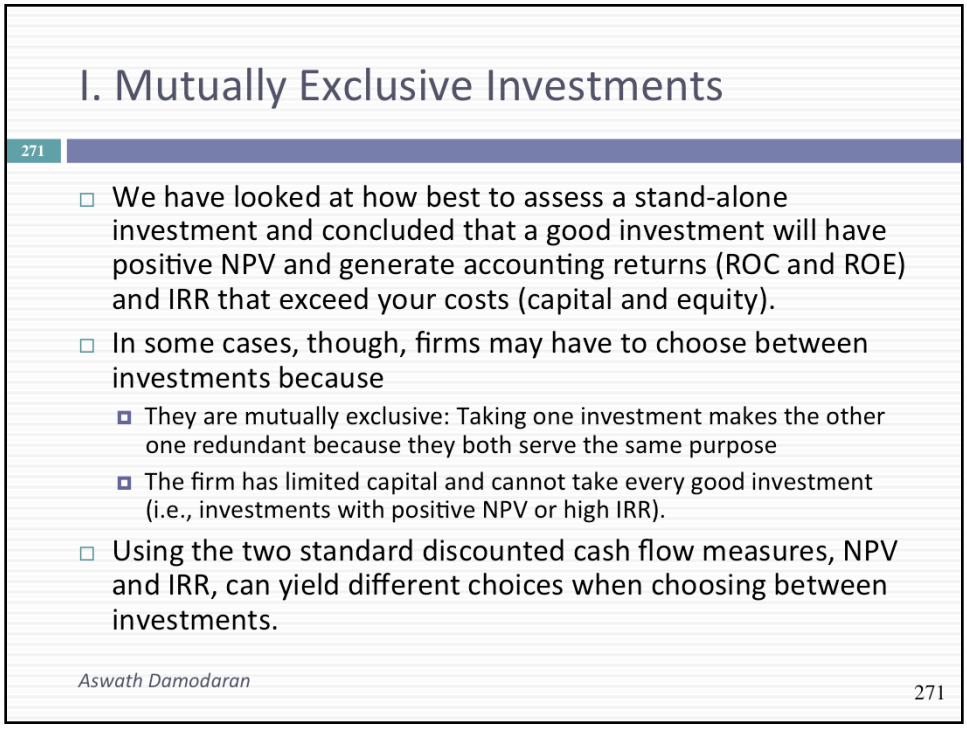
When we discount cash flows to the firm at the cost of capital, we are valuing the operating assets of the firm. We add cash and subtract out debt to get to the value of equity.

We will return to examine how best to value synergy later in the presentation.

Now that we have looked at how best to assess an investment that stands alone (independent investments), it is time to make life complicated.

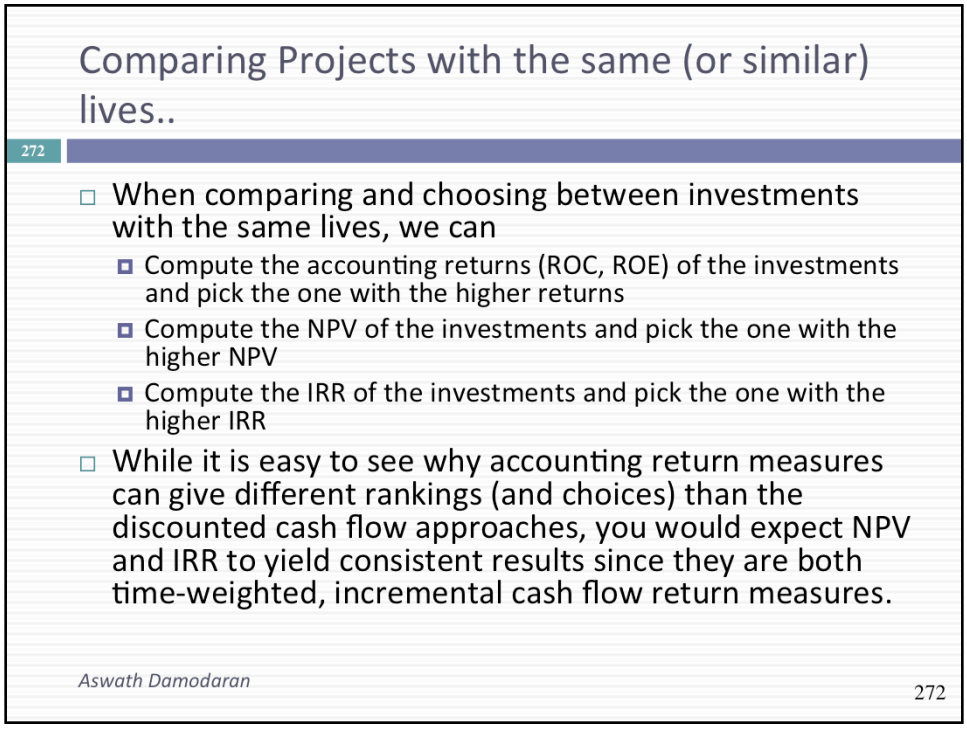


At most firms, an investment cannot be assessed by itself since it affects not only other investments that the firm has on its books already but future investments.



In some cases, exclusivity will be thrust upon you because two investments serve the same purpose. This is the case, for instance, when you choose between different distribution or computer systems to serve your needs or between alternative marketing strategies.

In other cases, the exclusivity is created by the fact that you do not have the capital (or the access to it) to take every good investment that comes along. Thus, good investments compete against each other.



Discounted cash flow measures (NPV and IRR) share the same DNA and yield the same conclusions when looking at independent investments. If an investment has a positive NPV, the IRR> Discount rate. However, this may no longer hold when you are comparing two or more investments, as we will see by looking at three cases where the choices vary.

Case 1: IRR versus NPV

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- Consider two projects with the following cash flows:

Year	Project 1 CF	Project 2 CF
0	-1000	-1000
1	800	200
2	1000	300
3	1300	400
4	-2200	500

Provides cash flows on a single project. You could compute the net present value or compute the IRR.

Project's NPV Profile

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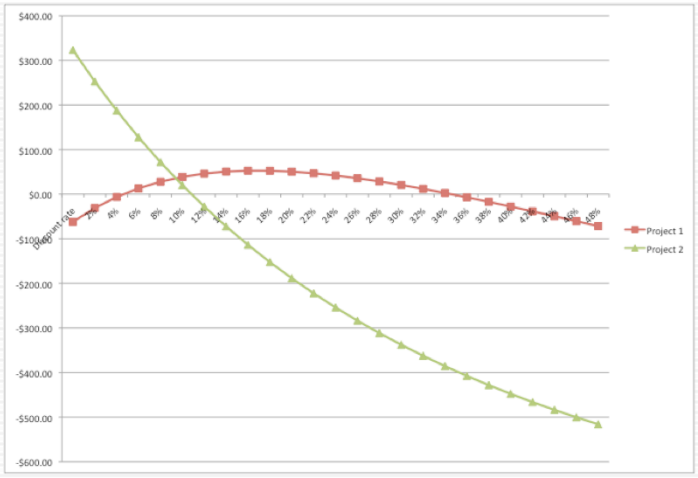

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Project 1 has two Internal Rates of Return (IRR) - one is around 7% and the other is over 36%…

Project 2 has one internal rate of return: about 12%

What do we do now?

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- Project 1 has two internal rates of return. The first is 6.60%, whereas the second is 36.55%. Project 2 has one internal rate of return, about 12.8%.
- Why are there two internal rates of return on project 1?
- If your cost of capital is 12%, which investment would you accept?
  a. Project 1
  b. Project 2
- Explain.

Because there are two sign changes fn the cash flows, one in year 1 and one in year 4.

I would accept project 2, if the discount rate is 12% because it has a higher NPV.

Case 2: NPV versus IRR

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Project A

Cash Flow $ 350,000 $ 450,000 $ 600,000 $ 750,000

Investment $ 1,000,000

NPV = $467,937
IRR= 33.66%

Project B

Cash Flow $ 3,000,000 $ 3,500,000 $ 4,500,000 $ 5,500,000

Investment $ 10,000,000

NPV = $1,358,664
IRR=20.88%

These investments are mutually exclusive. Note the difference in scale. IRR, as a percent measure, will be biased towards smaller investments whereas NPV as a dollar value, will be biased towards larger investments.

Which one would you pick?

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- Assume that you can pick only one of these two projects. Your choice will clearly vary depending upon whether you look at NPV or IRR. You have enough money currently on hand to take either. Which one would you pick?
  a. Project A. It gives me the bigger bang for the buck and more margin for error.
  b. Project B. It creates more dollar value in my business.
- If you pick A, what would your biggest concern be?
- If you pick B, what would your biggest concern be?

Depends upon whether you face capital rationing. If you do not have capital rationing, you should use NPV (and pick project B). The more serious the capital rationing constraint, the more likely that IRR will be used (to pick project A)

If you pick project A, the biggest risk is that no other projects come along during the course of the period, and the funds stay uninvested (earning a NPV of zero).

If you pick project B, the biggest risk is that lots of very good projects earning higher returns than B come along and you do not have the funds to accept them.

Capital Rationing, Uncertainty and Choosing a Rule

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- If a business has limited access to capital, has a stream of surplus value projects and faces more uncertainty in its project cash flows, it is much more likely to use IRR as its decision rule.
  - Small, high-growth companies and private businesses are much more likely to use IRR.
- If a business has substantial funds on hand, access to capital, limited surplus value projects, and more certainty on its project cash flows, it is much more likely to use NPV as its decision rule.
- As firms go public and grow, they are much more likely to gain from using NPV.

Small firms that are successful become large firms, but some continue to act as if they have a capital rationing constraint and maintain unrealistically high hurdle rates. These firms will often accumulate cash while turning away projects that earn more than their cost of capital.

The sources of capital rationing…

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Cause	*Number of firms*	*Percent of total*
Debt limit imposed by outside agreement	10	10.7
Debt limit placed by management external to firm	3	3.2
Limit placed on borrowing by internal management	65	69.1
Restrictive policy imposed on retained earnings	2	2.1
Maintenance of target EPS or PE ratio	14	14.9

In a world where firms had free and complete access to capital markets and information could be conveyed credibly to financial markets, there would be no capital rationing constraints. Any firm with a good project (positive NPV) would be able to raise the funds to take the investment. In the real world, there are market frictions that can cause capital rationing. This table is the result of an old survey (1976) which tried to identify the reasons for capital rationing.

More often than not, the source of capital rationing s not external (lack of access to markets, inability to convey information, transactions costs) but by internal factors (management is conservative, restrictions on human capital…)

Many firms also create implicit capital constraints by setting their hurdle rates higher than their cost of capital.

An Alternative to IRR with Capital Rationing

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- The problem with the NPV rule, when there is capital rationing, is that it is a dollar value. It measures success in absolute terms.
- The NPV can be converted into a relative measure by dividing by the initial investment. This is called the profitability index.
  - Profitability Index (PI) = NPV/Initial Investment
- In the example described, the PI of the two projects would have been:
  - PI of Project A = $467,937/1,000,000 = 46.79%
  - PI of Project B = $1,358,664/10,000,000 = 13.59%
  - Project A would have scored higher.

It is possible to convert NPV, which is dollar measure of value, into a percentage measure by dividing by the initial investment.

The rankings will be similar to IRR but the two approaches make different assumptions about what rate the intermediate cash flows get reinvested at. (This will be illustrated on the next two overheads)

Case 3: NPV versus IRR

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Project A

Cash Flow $ 5,000,000 $ 4,000,000 $ 3,200,000 $ 3,000,000

Investment $ 10,000,000

NPV = $1,191,712
IRR=21.41%

Project B

Cash Flow $ 3,000,000 $ 3,500,000 $ 4,500,000 $ 5,500,000

Investment $ 10,000,000

NPV = $1,358,664
IRR=20.88%

The projects have the same scale. Why are the two approaches yielding different rankings? (They are both discounted cash flow approaches, but they must be time-weighting the cash flows slightly differently to yield different rankings)

Why the difference?

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- These projects are of the same scale. Both the NPV and IRR use time-weighted cash flows. Yet, the rankings are different. Why?

- Which one would you pick?
  a. Project A. It gives me the bigger bang for the buck and more margin for error.
  b. Project B. It creates more dollar value in my business.

NPV assumes that intermediate cash flows get reinvested at the cost of capital, while IRR assumes that they get reinvested at the IRR.

I would pick project B. It is much more reasonable to assume that you can earn the cost of capital on the intermediate cash flows (since the cost of capital is based upon what investments of similar risk are making in the market place)

NPV, IRR and the Reinvestment Rate Assumption

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- The NPV rule assumes that intermediate cash flows on the project get reinvested at the hurdle rate (which is based upon what projects of comparable risk should earn).
- The IRR rule assumes that intermediate cash flows on the project get reinvested at the IRR. Implicit is the assumption that the firm has an infinite stream of projects yielding similar IRRs.
- Conclusion: *When the IRR is high (the project is creating significant surplus value) and the project life is long, the IRR will overstate the true return on the project.*

The higher the IRR, the more dangerous this reinvestment assumption becomes. Note that this reinvestment assumption will never make a bad project into a good project. It just makes a good project look better than it really is.

Solution to Reinvestment Rate Problem

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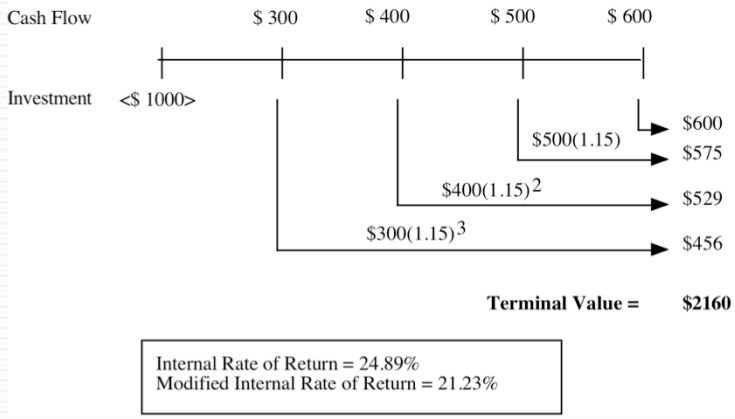
Figure 6.3: IRR versus Modified Internal Rate of Return



Internal Rate of Return = 24.89%
Modified Internal Rate of Return = 21.23%

This is the modified IRR. Its rankings are going to be very similar to those yielded by the PI approach.

Why NPV and IRR may differ.. Even if projects have the same lives

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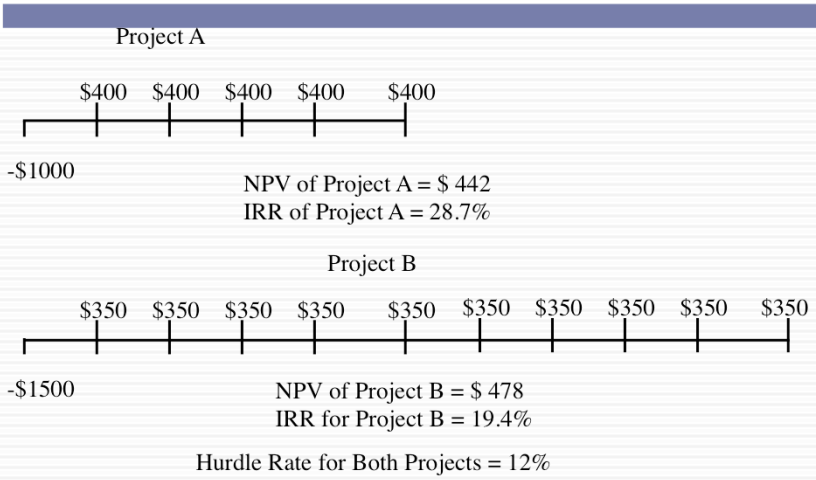
- A project can have only one NPV, whereas it can have more than one IRR.
- The NPV is a dollar surplus value, whereas the IRR is a percentage measure of return. The NPV is therefore likely to be larger for "large scale" projects, while the IRR is higher for "small-scale" projects.
- The NPV assumes that intermediate cash flows get reinvested at the "hurdle rate", which is based upon what you can make on investments of comparable risk, while the IRR assumes that intermediate cash flows get reinvested at the "IRR".

This summarizes the conclusions of the last 3 illustrations. Generally, the NPV approach is based upon sounder fundamental assumptions, but does assume that the firm has the capital to take positive NPV projects.

Comparing projects with different lives..



The NPV of the shorter life project will generally be lower than the NPV of the longer-life project. This is an issue only if they are mutually exclusive, i.e. you can pick only one.

Why NPVs cannot be compared.. When projects have different lives.

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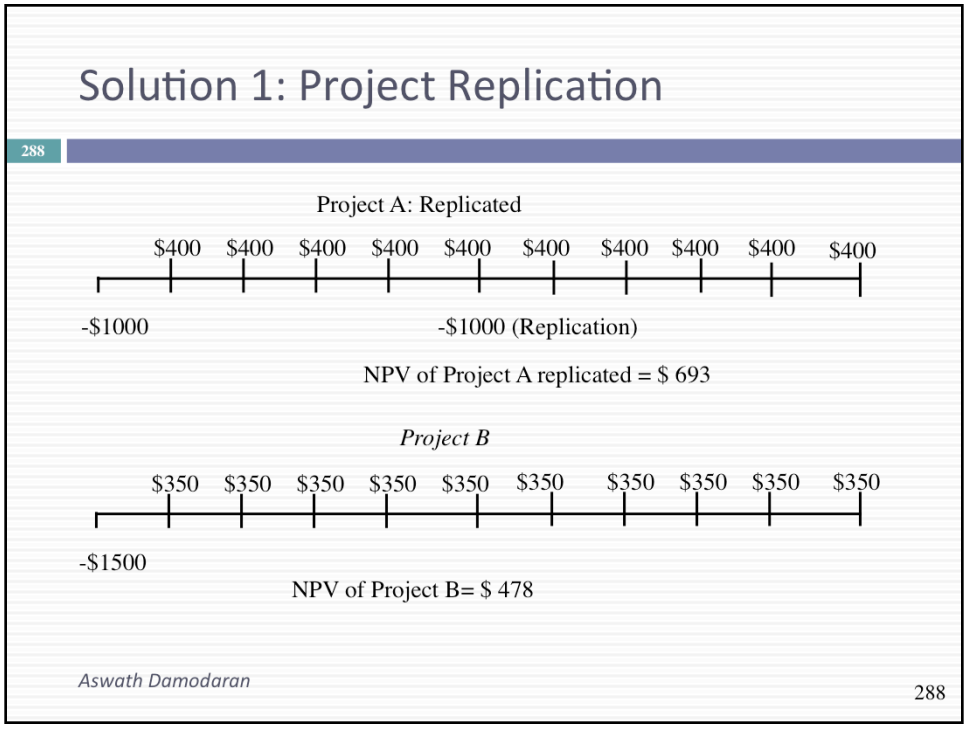
- The net present values of mutually exclusive projects with different lives cannot be compared, since there is a bias towards longer-life projects. To compare the NPV, we have to
  - replicate the projects till they have the same life (or)
  - convert the net present values into annuities
- The IRR is unaffected by project life. We can choose the project with the higher IRR.

If you pick projects based on NPV, you will tend to accept longer life projects over shorter life projects. In effect, you are assuming that you have no other excess return investments on the horizon after these projects run out.

You can use IRR, but it comes with its own baggage (reinvestment rate assumptions, scaling issues)



Here, we have done the replication assuming that the cash flows are identical for the second replication. (This does not have to be the case)

This process will become more complicated if you are comparing projects with 7 and 9 year lives, for instance.

Solution 2: Equivalent Annuities

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- Equivalent Annuity for 5-year project
  - = $442 * PV(A,12%,5 years)
  - = $ 122.62
- Equivalent Annuity for 10-year project
  - = $478 * PV(A,12%,10 years)
  - = $ 84.60

This is simpler than replication but it is actually based upon the principle of infinite replication. The conclusions will be the same as with replication with the same cash flows. (Implicitly, you are making the same assumptions).

What would you choose as your investment tool?

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- Given the advantages/disadvantages outlined for each of the different decision rules, which one would you choose to adopt?
  a. Return on Investment (ROE, ROC)
  b. Payback or Discounted Payback
  c. Net Present Value
  d. Internal Rate of Return
  e. Profitability Index
- Do you think your choice has been affected by the events of the last quarter of 2008? If so, why? If not, why not?

If you believe that access to capital markets is easy, you will tend to go with the NPV rule.

One effect of a market crisis like 2008 is that it makes us all more leery about assuming capital market access and may push people to go back to the IRR rule, with perhaps a reinvestment rate modification (MIRR) since we are also probably less likely to assume a constant stream of good projects coming our way.

What firms actually use ..

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Decision Rule	% of Firms using as primary decision rule in		
	1976	**1986**	**1998**
IRR	53.6%	49.0%	42.0%
Accounting Return	25.0%	8.0%	7.0%
NPV	9.8%	21.0%	34.0%
Payback Period	8.9%	19.0%	14.0%
Profitability Index	2.7%	3.0%	3.0%

Why do so many firms pick IRR, if NPV is the superior approach?

Because many firms, whether it is true or not, perceive themselves to be operating with a capital rationing constraint.

Most decision-makers, for whatever reason, are more comfortable looking at percentage rates of return rather than dollar values.

II. Side Costs and Benefits

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- 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.

These costs and benefits should be incorporated, but that is easier said than done.

Some projects deliver most of their benefits indirectly…For instance, a Disney animated movie will often make four times as much revenue for Disney from merchandise sales and theme park revenues as it does in gate receipts. Thus, this is not a minor issue.

A. Opportunity Cost

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- An opportunity cost arises when a project uses a resource that may already have been paid for by the firm.
- When a resource that is already owned by a firm is being considered for use in a project, this resource has to be priced on its next best alternative use, which may be
  - a sale of the asset, in which case the opportunity cost is the expected proceeds from the sale, net of any capital gains taxes
  - renting or leasing the asset out, in which case the opportunity cost is the expected present value of the after-tax rental or lease revenues.
  - use elsewhere in the business, in which case the opportunity cost is the cost of replacing it.

In most established businesses, this occurs frequently. Companies constantly redeploy assets that they own to new investments rather than buy new assets. These assets do have alternate uses and have to be costed out.

This can involve

Real assets, like land, buildings or equipment

Individuals, who work for the firm already on other project or divisions

Excess capacity in computer systems, distribution systems etc.

Case 1: Foregone Sale?

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- Assume that Disney owns land in Rio already. This land is undeveloped and was acquired several years ago for $ 5 million for a hotel that was never built. It is anticipated, if this theme park is built, that this land will be used to build the offices for Disney Rio. The land currently can be sold for $ 40 million, though that would create a capital gain (which will be taxed at 20%). In assessing the theme park, which of the following would you do:
  - Ignore the cost of the land, since Disney owns its already
  - Use the book value of the land, which is $ 5 million
  - Use the market value of the land, which is $ 40 million
  - Other:

Use the market value of the land, net of capital gains taxes.

$$\$ 40 \text{ million} - 0.2 (40 - 5) = \$ 33 \text{ million}$$

This is the cash flow you would have generated if the project was not taken.

Case 2: Incremental Cost?
An Online Retailing Venture for Bookscape

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- The initial investment needed to start the service, including the installation of additional phone lines and computer equipment, will be $1 million. These investments are expected to have a life of four years, at which point they will have no salvage value. The investments will be depreciated straight line over the four-year life.
- The revenues in the first year are expected to be $1.5 million, growing 20% in year two, and 10% in the two years following. The cost of the books will be 60% of the revenues in each of the four years.
- The salaries and other benefits for the employees are estimated to be $150,000 in year one, and grow 10% a year for the following three years.
- The working capital, which includes the inventory of books needed for the service and the accounts receivable will be10% of the revenues; the investments in working capital have to be made at the beginning of each year. At the end of year 4, the entire working capital is assumed to be salvaged.
- The tax rate on income is expected to be 40%.

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Bookscape is considering this expansion into online retailing.

Cost of capital for investment

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- We will re-estimate the beta for this online project by looking at publicly traded online retailers. The unlevered total beta of online retailers is 3.02, and we assume that this project will be funded with the same mix of debt and equity (D/E = 21.41%, Debt/Capital = 17.63%) that Bookscape uses in the rest of the business. We will assume that Bookscape's tax rate (40%) and pretax cost of debt (4.05%) apply to this project.

  Levered Beta $_{\text{Online Service}}$ = 3.02 [1 + (1 – 0.4) (0.2141)] = 3.41

  Cost of Equity $_{\text{Online Service}}$ = 2.75% + 3.41 (5.5%) = 21.48%

  Cost of Capital$_{\text{Online Service}}$ = 21.48% (0.8237) + 4.05% (1 – 0.4) (0.1763) = 18.12%

- This is much higher than the cost of capital (10.30%) we computed for Bookscape earlier, but it reflects the higher risk of the online retail venture.

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The median unlevered market beta across 29 online retailers in the US is 1.45, and the average correlation of these stocks with the market is 0.48. The unlevered total beta is therefore 1.45/0.48 = 3.02.

Incremental Cash flows on Investment

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	0	1	2	3	4
Revenues		$1,500,000	$1,800,000	$1,980,000	$2,178,000
Operating Expenses					
Labor		$150,000	$165,000	$181,500	$199,650
Materials		$900,000	$1,080,000	$1,188,000	$1,306,800
Depreciation		$250,000	$250,000	$250,000	$250,000
Operating Income		$200,000	$305,000	$360,500	$421,550
Taxes		$80,000	$122,000	$144,200	$168,620
After-tax Operating Income		$120,000	$183,000	$216,300	$252,930
+ Depreciation		$250,000	$250,000	$250,000	$250,000
- Change in Working Capital	$150,000	$30,000	$18,000	$19,800	-$217,800
+ Salvage Value of Investment					$0
Cash flow after taxes	-$1,150,000	$340,000	$415,000	$446,500	$720,730
Present Value	-$1,150,000	$287,836	$297,428	$270,908	$370,203

NPV of investment = $76,375

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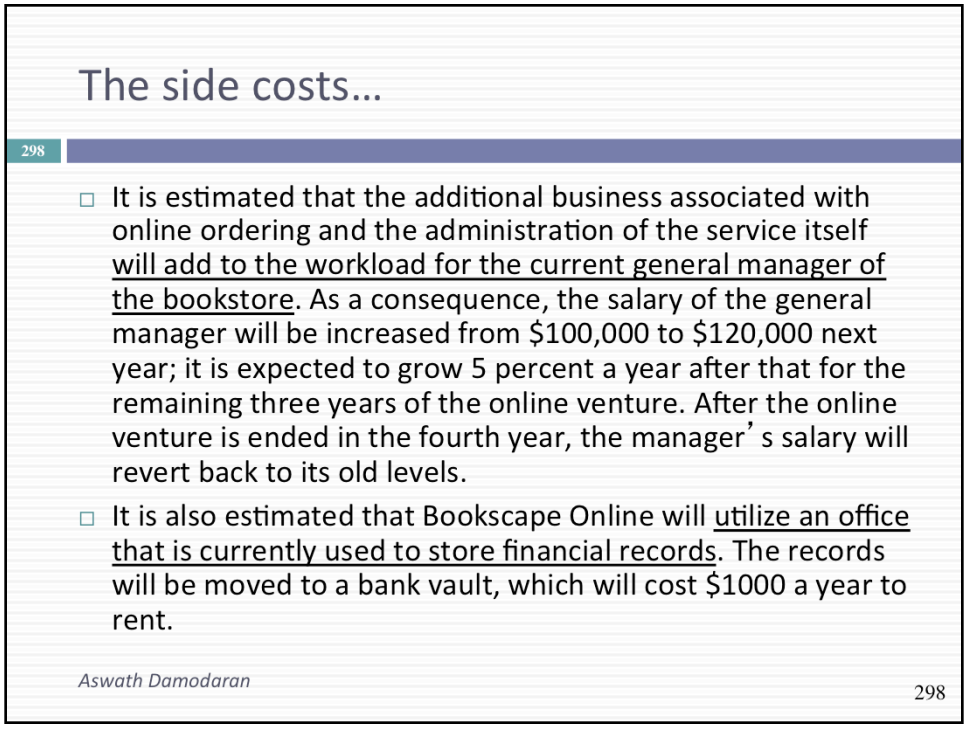
The NPV for this project is positive, suggesting that Bookscape will gain from expanding online.



These are the side costs to the firm from taking the investment.

NPV with side costs…

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- Additional salary costs = PV of $34,352

	1	2	3	4
Increase in Salary	$20,000	$21,000	$22,050	$23,153
After-tax expense	$12,000	$12,600	$13,230	$13,892
Present Value @18.12%	$10,159	$9,030	$8,027	$7,136

- Office Costs
  - After-Tax Additional Storage Expenditure per Year = $1,000 (1 – 0.40) = $600
  - PV of expenditures = $600 (PV of annuity, 18.12%,4 yrs) = $1,610
- NPV with Opportunity Costs = $76,375 – $34,352 – $1,610= $ 40,413
- Opportunity costs aggregated into cash flows

Year	Cashflows	Opportunity costs	Cashflow with opportunity costs	Present Value
0	($1,150,000)		($1,150,000)	($1,150,000)
1	$340,000	$12,600	$327,400	$277,170
2	$415,000	$13,200	$401,800	$287,968
3	$446,500	$13,830	$432,670	$262,517
4	$720,730	$14,492	$706,238	$362,759
Adjusted NPV				$40,413

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We can either consider the side costs separately and add them to the NPV or incorporate them into the cash flows/ The answer is the same using either.

Case 3: Excess Capacity

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- In the Vale example, assume that the firm will use its existing distribution system to service the production out of the new iron ore mine. The mine manager argues that there is no cost associated with using this system, since it has been paid for already and cannot be sold or leased to a competitor (and thus has no competing current use). Do you agree?
  a. Yes
  b. No

No. Using that excess capacity will create a cost down the road for the firm.

A Framework for Assessing The Cost of Using Excess Capacity

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- If I do not add the new product, when will I run out of capacity?
- If I add the new product, when will I run out of capacity?
- When I run out of capacity, what will I do?
  - Cut back on production: cost is PV of after-tax cash flows from lost sales
  - Buy new capacity: cost is difference in PV between earlier & later investment

Answering these three questions will help you map out the cost to the company of what will happen in the future.

Product and Project Cannibalization: A Real Cost?

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- Assume that in the Disney theme park example, 20% of the revenues at the Rio Disney park are expected to come from people who would have gone to Disney theme parks in the US. In doing the analysis of the park, you would
  a. Look at only incremental revenues (i.e. 80% of the total revenue)
  b. Look at total revenues at the park
  c. Choose an intermediate number
- Would your answer be different if you were analyzing whether to introduce a new show on the Disney cable channel on Saturday mornings that is expected to attract 20% of its viewers from ABC (which is also owned by Disney)?
  a. Yes
  b. No

The answer will depend upon whether the cannibalization would occur anyway (to a competitor, if Disney does not take the project). The greater the barriers to entry or the competitive advantage that Disney has over its competitors, the less likely it is that cannibalization would occur anyway. In that case, it should be treated as an incremental cost. If not, it should be treated as non-incremental and ignored.

I would argue that Disney has far greater competitive advantages at its theme parks, than it does in TV broadcasting. Therefore, I would look at only the incremental revenue for the theme park, and the total revenues for the TV show.

B. Project Synergies

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- A project may provide benefits for other projects within the firm. Consider, for instance, a typical Disney animated movie. Assume that it costs $ 50 million to produce and promote. This movie, in addition to theatrical revenues, also produces revenues from
  - the sale of merchandise (stuffed toys, plastic figures, clothes ..)
  - increased attendance at the theme parks
  - stage shows (see "Beauty and the Beast" and the "Lion King")
  - television series based upon the movie
- In investment analysis, however, these synergies are either left unquantified and used to justify overriding the results of investment analysis, i.e,, used as justification for investing in negative NPV projects.
- If synergies exist and they often do, these benefits have to be valued and shown in the initial project analysis.

Disney is a master at creating project synergies. In analyzing new investments, we have two choices in how we deal with synergies.

a. Assume that they exist and will be large enough to offset any negatives associated with the investment. (This is all too common in big investments, where companies fall back on the "strategic benefits" argument to overwhelm financial considerations).

b. Try to quantify the benefits and bring them into the cash flows and returns and make sure that the project meets its financial hurdles.

Case 1: Adding a Café to a bookstore: Bookscape

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- Assume that you are considering adding a café to the bookstore. Assume also that based upon the expected revenues and expenses, the café standing alone is expected to have a net present value of -$87,571.
- The cafe will increase revenues at the book store by $500,000 in year 1, growing at 10% a year for the following 4 years. In addition, assume that the pre-tax operating margin on these sales is 10%.

		1	2	3	4	5
Increased Revenues		$500,000	$550,000	$605,000	$665,500	$732,050
Operating Margin		10.00%	10.00%	10.00%	10.00%	10.00%
Operating Income		$50,000	$55,000	$60,500	$66,550	$73,205
Operating Income after Taxes		$30,000	$33,000	$36,300	$39,930	$43,923
PV of Additional Cash Flows		$27,199	$27,126	$27,053	$26,981	$26,908
PV of Synergy Benefits		$135,268				

- The net present value of the added benefits is $135,268. Added to the NPV of the standalone Café of -$87,571 yields a net present value of $47,697.

This is a café being added on to an existing bookstore. The revenues shown here are the revenues at the café.

With the side benefits, the café looks like a good investment.

Interesting side questions;

1.Should we be using different discount rates for the café revenues and the bookstore revenues? (I don't think so since the café is an extension of the bookstore)

2.If we had used different discount rates, whose discount rate should be used to discount the synergies?

Case 2: Synergy in a merger..

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- We valued Harman International for an acquisition by Tata Motors and estimated a value of $ 2,476 million for the operating assets and $ 2,678 million for the equity in the firm, concluding that it would not be a value-creating acquisition at its current market capitalization of $5,248 million. In estimating this value, though, we treated Harman International as a stand-alone firm.
- Assume that Tata Motors foresees potential synergies in the combination of the two firms, primarily from using its using Harman's high-end audio technology (speakers, tuners) as optional upgrades for customers buying new Tata Motors cars in India. To value this synergy, let us assume the following:
  - It will take Tata Motors approximately 3 years to adapt Harman's products to Tata Motors cars.
  - Tata Motors will be able to generate Rs 10 billion in after-tax operating income in year 4 from selling Harman audio upgrades to its Indian customers, growing at a rate of 4% a year after that in perpetuity (but only in India).

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In most acquisitions, synergy is provided as a motive and used to justify large premiums. While synergy does exist, we believe that it is often not valued correctly (or at all) and that acquirers pay too much for it.

In our earlier assessment of the value of Sensient to Tata, we ignored synergy all together. Now we are considering what form the synergy will take.

Estimating the cost of capital to use in valuing synergy..

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- Business risk: The perceived synergies flow from optional add-ons in auto sales. We will begin with the levered beta of 1.10, that we estimated for Tata Motors in chapter 4, in estimating the cost of equity.
- Geographic risk: The second is that the synergies are expected to come from India; consequently, we will add the country risk premium of 3.60% for India, estimated in chapter 4 (for Tata Motors) to the mature market premium of 5.5%.
- Debt ratio: Finally, we will assume that the expansion will be entirely in India, with Tata Motors maintain its existing debt to capital ratio of 29.28% and its current rupee cost of debt of 9.6% and its marginal tax rate of 32.45%.
  - Cost of equity in Rupees = 6.57% + 1.10 (5.5%+3.60%) = 16.59%
  - Cost of debt in Rupees = 9.6% (1-.3245) = 6.50%
  - Cost of capital in Rupees = 16.59% (1-.2928) + 6.50% (.2928) = 13.63%

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To estimate the right discount rate to use to value synergy, we have to assess where the cash flows are coming from,. The right discount rate to use for synergy will therefore vary from case to case.. While we used Sensient's risk and debt characteristics to estimate the value of synergy in this case, we may use the combined firm's cost of capital, if synergy takes a different form.

Estimating the value of synergy… and what Tata can pay for Harman

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- Value of synergy$_{\text{Year 3}}$ = $\frac{\text{Expected Cash Flow}_{\text{Year 4}}}{\text{(Cost of Capital - g)}} = \frac{10{,}000}{(.1363-.04)} =$ Rs 103,814 million
- Value of synergy today = $\frac{\text{Value of Synergy}_{\text{year 3}}}{(1+\text{Cost of Capital})^3} = \frac{103{,}814}{(1.1363)^3} =$ Rs 70,753 million
- Converting the synergy value into dollar terms at the prevailing exchange rate of Rs 60/$, we can estimate a dollar value for the synergy from the potential acquisition:
  - Value of synergy in US $ = Rs 70,753/60 = $ 1,179 million
- Adding this value to the intrinsic value of $2,678 million that we estimated for Harman's equity in chapter 5, we get a total value for the equity of $3,857 million.
  - Value of Harman = $2,664 million + $1,179 million = $3,843 million
- Since Harman's equity trades at $5,248 million, the acquisition still does not make sense, even with the synergy incorporated into value.

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Note that we are not recommending that Tata pay $1,179 million for synergy. To create value, you have to pay less than what you derive in return. Thus, Tata should be looking for ways in which It can pay below $1,179 million on this acquisition.

III. Project Options

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- One of the limitations of traditional investment analysis is that it is static and does not do a good job of capturing the options embedded in investment.
  - The first of these options is the option to delay taking a project, when a firm has exclusive rights to it, until a later date.
  - The second of these options is taking one project may allow us to take advantage of other opportunities (projects) in the future
  - The last option that is embedded in projects is the option to abandon a project, if the cash flows do not measure up.
- These options all add value to projects and may make a "bad" project (from traditional analysis) into a good one.

Most projects have one or more than one option embedded in them. These options can not only have significant economic value but can lead us to reverse the decisions that we would have made with conventional capital budgeting analysis.

The Option to Delay

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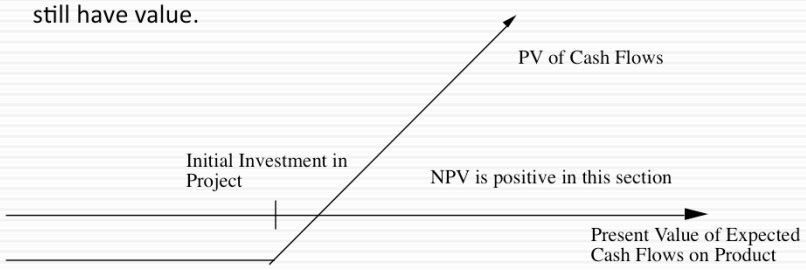
- When a firm has exclusive rights to a project or product for a specific period, it can delay taking this project or product until a later date. A traditional investment analysis just answers the question of whether the project is a "good" one if taken today. The rights to a "bad" project can still have value.



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Traditional investment analysis just looks at the question of whether a project is a good one, if taken today. It does not say the rights to this project are worthless.

Consequently, the rights to a bad project can be worth money, if viewed as an option.

This looks at the option to delay a project, to which you have exclusive rights.

The initial investment in the project is what you would need to invest to convert this project from a right to a real project.

The present value of the cash flows will change over time.

If the perceived present value of the cash flows stays below the investment needed, the project should never be taken.

Insights for Investment Analyses

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- Having the exclusive rights to a product or project is valuable, even if the product or project is not viable today.
- The value of these rights increases with the volatility of the underlying business.
- The cost of acquiring these rights (by buying them or spending money on development - R&D, for instance) has to be weighed off against these benefits.

The value of an option will increase with the uncertainty associated with the cash flows and value of the project.

Thus, firms should be willing to pay large amounts for the rights to technology in areas where there is tremendous uncertainty about what the future will bring, and much less in sectors where there is more stability.

The expenses incurred on R&D can be viewed as the cost of acquiring these rights.

The Option to Expand/Take Other Projects

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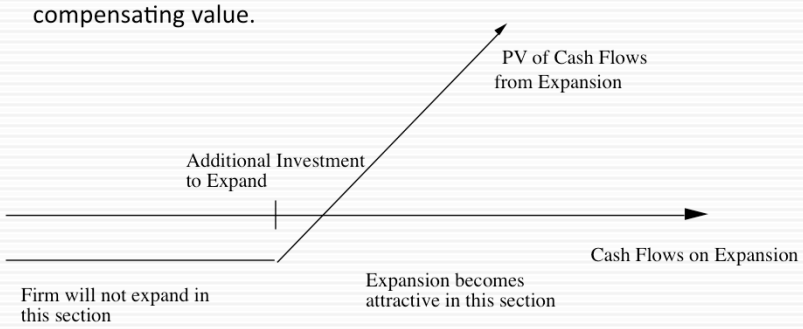
- Taking a project today may allow a firm to consider and take other valuable projects in the future. Thus, even though a project may have a negative NPV, it may be a project worth taking if the option it provides the firm (to take other projects in the future) has a more-than-compensating value.



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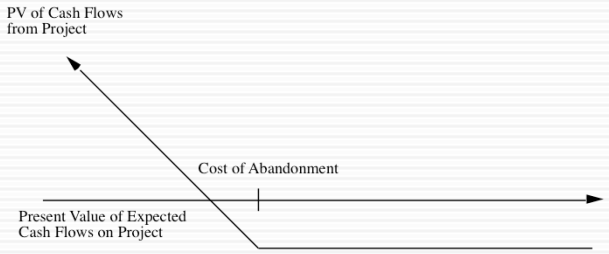
A project may be the first in a sequence and give you the right to far more lucrative investments in the future.

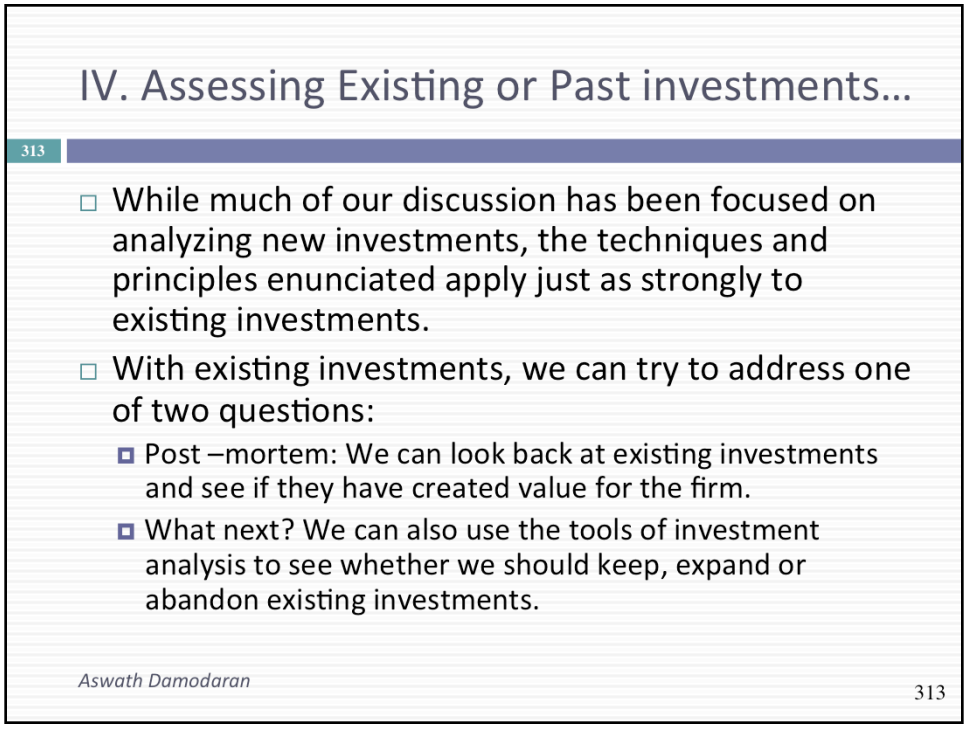
The Option to Abandon

312

- A firm may sometimes have the option to abandon a project, if the cash flows do not measure up to expectations.
- If abandoning the project allows the firm to save itself from further losses, this option can make a project more valuable.



You would like to abandon a project, once you know that it will create only negative cash flows for you. This is not always possible, because of contracts you might have entered into with employees or customers.



While looking at new investments is a key part of investment analysis, we cannot ignore investments made in the past. Not only can they offer lessons for the future but they can also be used to improve our assessments of new investments.

Analyzing an Existing Investment

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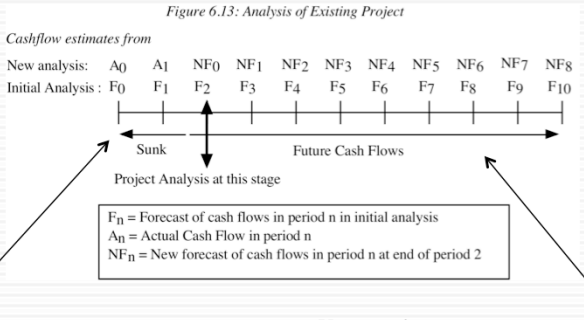
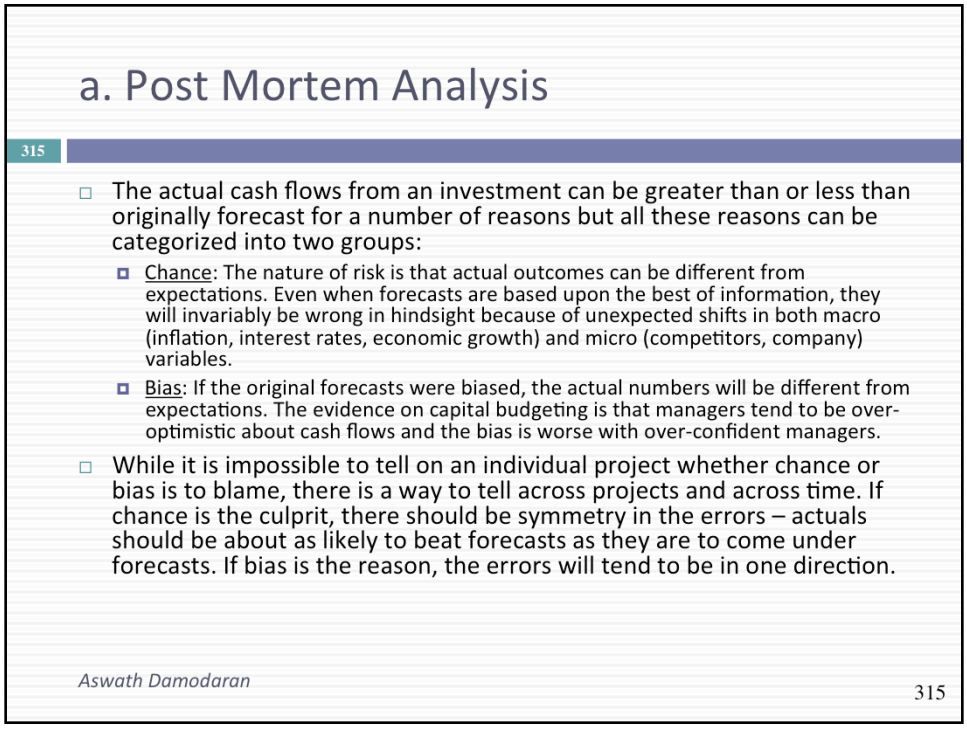
Figure 6.13: Analysis of Existing Project



In a post-mortem, you look at the actual cash flows, relative to forecasts.

You can also reassess your expected cash flows, based upon what you have learned, and decide whether you should expand, continue or divest (abandon) an investment

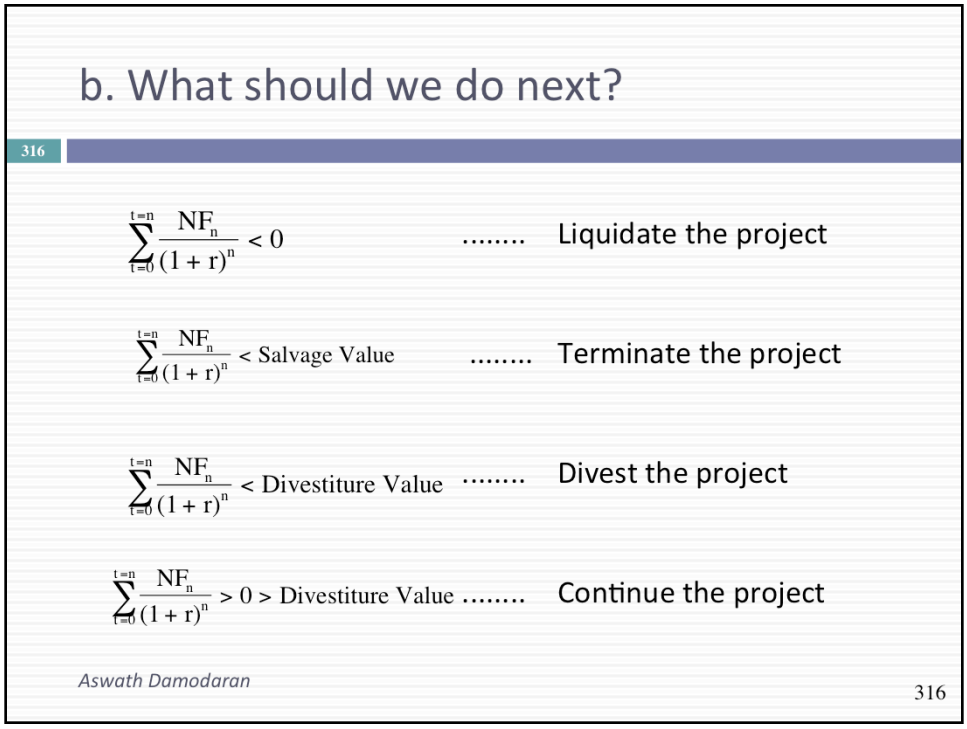
When looking at an existing investment, you can look back (in regret or celebration) and forward (to make the best assessment of what to do next)



When assessing risky investments, you will always be wrong (at least in hindsight). However, why you are wrong makes a difference, If is due to chance, you will be at least partially protected by having a portfolio of projects, The larger that portfolio, the more likely it is that your mistakes will average out over time. With bias, though, the law of averages will not work for you.

That is the part of the reason why the objective in designing an investment analysis process should be minimizing bias and not minimizing errors.

There are two beneifts to post-mortems. The first is that you can hold the project analysts responsible for their own forecasts. The second is that you can use the information from the actuals to reassess your forecasts for the rest of the project life.



At first sight, whether to liquidate or continue a project seems like a no brainer. Projects that deliver cash flows that are less than expected should be terminated whereas those that deliver more than expected cash flows should be continued and even expanded. Unfortunately, it is not that simple. Terminating a project will not mean that you will get the capital your originally invested in it back. Thus, even a bad project may be worth continuing because divesting it now yields too low a value. Conversely, your best projects may be worth divesting if someone is willing to pay a much higher price for them than what you would make from continuing the investment.

Example: Disney California Adventure – The 2008 judgment call

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- Disney opened the Disney California Adventure (DCA) Park in 2001, at a cost of $1.5 billion, with a mix of roller coaster ridesand movie nostalgia. Disney expected about 60% of its visitors to Disneyland to come across to DCA and generate about $ 100 million in annual after-cash flows for the firm.
- By 2008, DCA had not performed up to expectations. Of the 15 million people who came to Disneyland in 2007, only 6 million visited California Adventure, and the cash flow averaged out to only $ 50 million between 2001 and 2007.
- In early 2008, Disney faced three choices:
  - Shut down California Adventure and try to recover whatever it can of its initial investment. It is estimated that the firm recover about $ 500 million of its investment.
  - Continue with the status quo, recognizing that future cash flows will be closer to the actual values ($ 50 million) than the original projections.
  - Invest about $ 600 million to expand and modify the par, with the intent of increasing the number of attractions for families with children, is expected to increase the percentage of Disneyland visitors who come to DCA from 40% to 60% and increase the annual after tax cash flow by 60% (from $ 50 million to $ 80 million) at the park.

DCA has been a huge investment for Disney that has not paid off. Disney has to do something, but what?

DCA: Evaluating the alternatives…

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- Continuing Operation: Assuming the current after-tax cash flow of $ 50 million will continue in perpetuity, growing at the inflation rate of 2% and discounting back at the theme park cost of capital in 2008 of 6.62% yields a value for continuing with the status quo

  Value of DCA = $\frac{\text{Expected Cash Flow next year}}{\text{(Cost of capital - g)}} = \frac{50(1.02)}{(.0662 - .02)} = \$1.103$ billion

- Abandonment: Abandoning this investment currently would allow Disney to recover only $ 500 million of its original investment.

  Abandonment value of DCA = $ 500 million

- Expansion: The up-front cost of $ 600 million will lead to more visitors in the park and an increase in the existing cash flows from $ 50 to $ 80 million.

  Value of CF from expansion = $\frac{\text{Increase in CF next year}}{\text{(Cost of capital - g)}} = \frac{30(1.02)}{(.0662 - .02)} = \$662$ million

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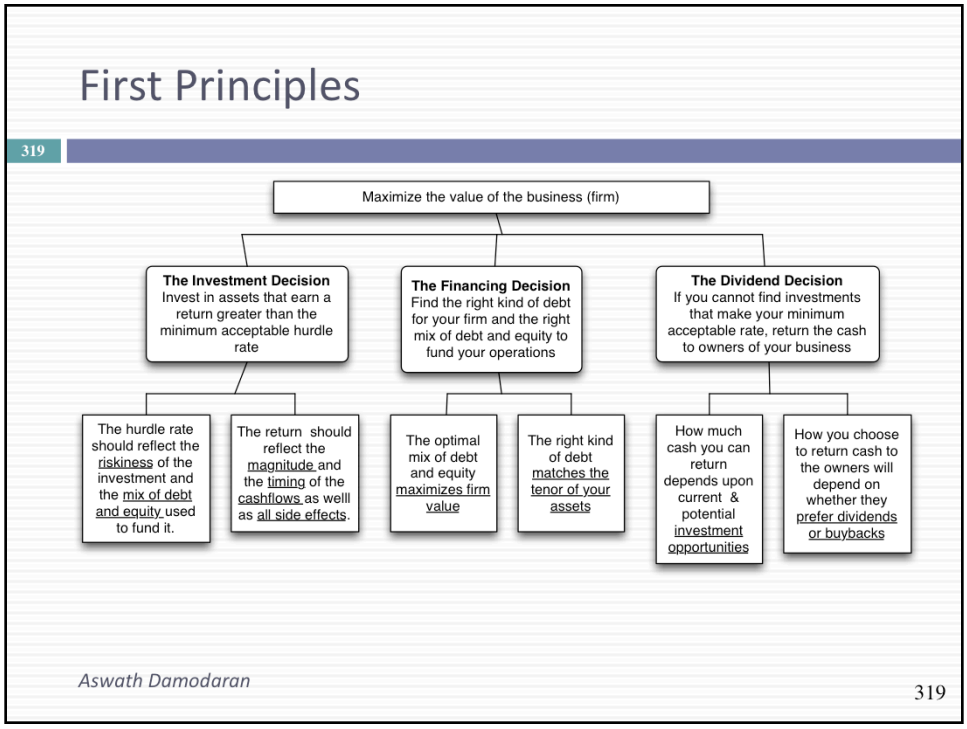
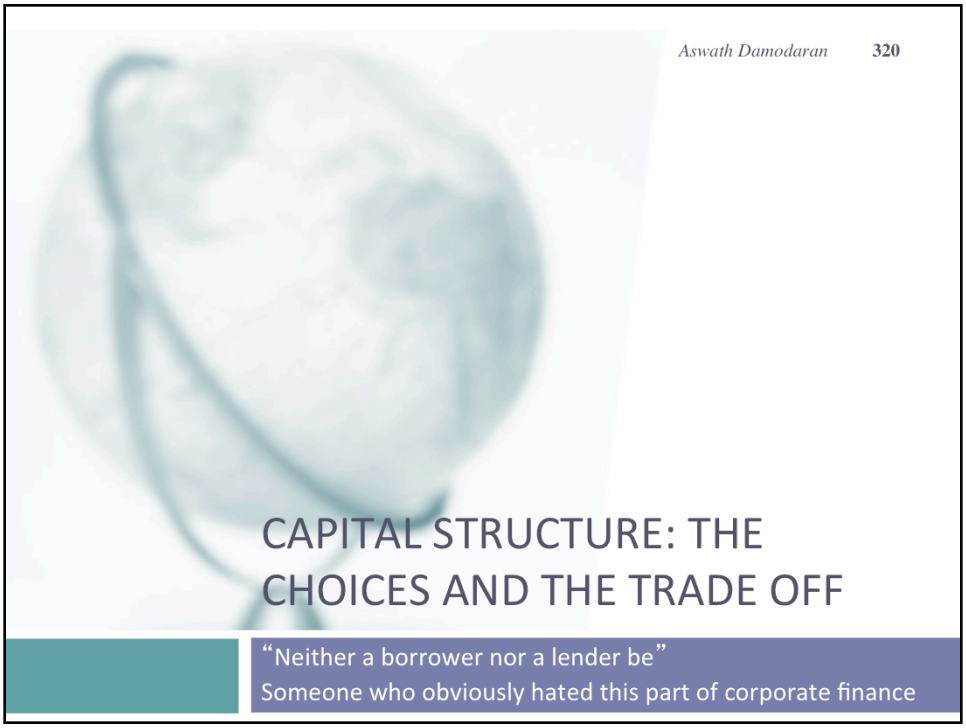
Abandonment makes no sense since the value of abandonment is less than the value from continuing. Since the NPV from expansion is positive, the optimal solution is to invest the additional $ 600 million into the park.



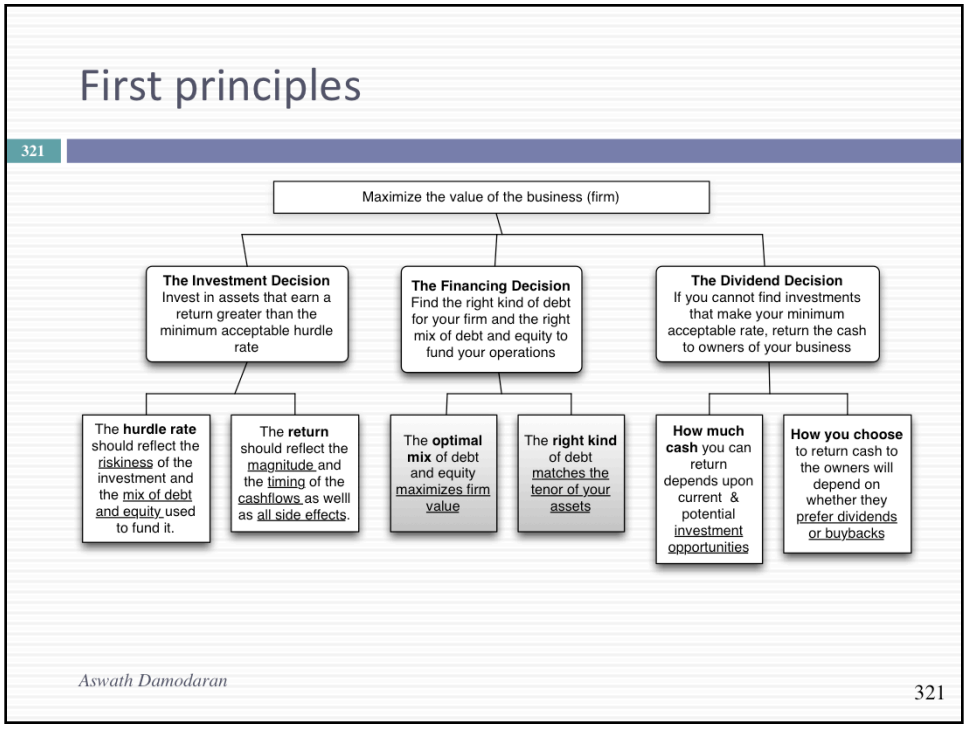
Reviewing the big picture…



CAPITAL STRUCTURE: THE CHOICES AND THE TRADE OFF

"Neither a borrower nor a lender be"
Someone who obviously hated this part of corporate finance

There is a deep seated feeling, reinforced by centuries of religious edicts, that good people do not borrow and that only the craven and the weak borrow to fund their businesses. In corporate finance, we take a much more sanguine view of debt. It is just another way of raising capital to fund a business. It is no more or less sinful that using equity…



We shift from the investment principle to the financing principle.

The Choices in Financing

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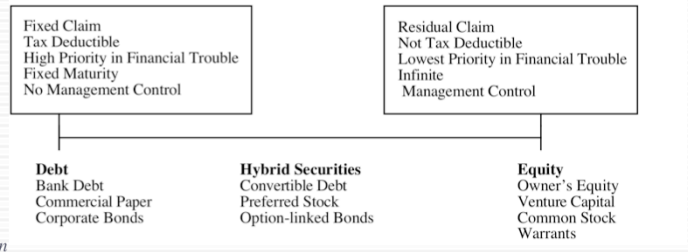
- There are only two ways in which a business can raise money.
  - The first is debt. The essence of debt is that you promise to make fixed payments in the future (interest payments and repaying principal). If you fail to make those payments, you lose control of your business.
  - The other is equity. With equity, you do get whatever cash flows are left over after you have made debt payments.

Figure 7.1: Debt versus Equity



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Rather than categorizing financing based on what it is called or categorized as by accountants, we should be thinking whether financing is debt or equity by looking at the following questions:

1. Are the payments on the securities contractual or residual?

If contractually set, it is closer to debt.

If residual, it is closer to equity.

2. Are the payments tax-deductible?

If yes, it is closer to debt.

If no, if is closer to equity.

3. Do the cash flows on the security have a high priority or a low priority if the firm is in financial trouble?

If it has high priority, it is closer to debt.

If it has low priority, it is closer to equity.

4. Does the security have a fixed life?

If yes, it is closer to debt.

If no, it is closer to equity.

5. Does the owner of the security get a share of the control of management of the firm?

If no, it is closer to debt.

If yes, if is closer to equity

Global Patterns in Financing…

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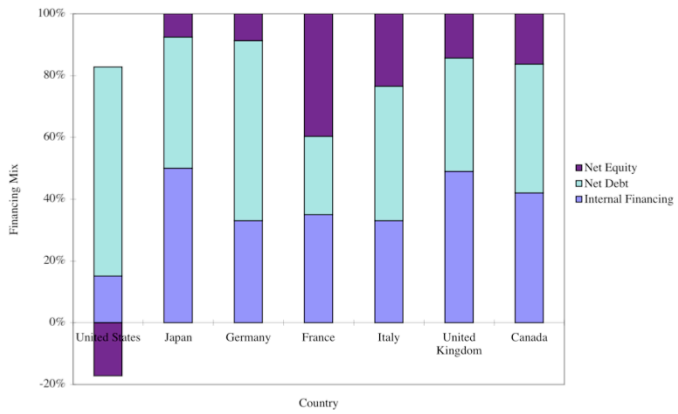
Figure 7.4: Financing Patterns for G-7 Countries – 1984-91



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Net equity refers to the difference between new equity issues and stock buybacks.

Firms in the United States, during the period of this comparison, bought back more stock than they issued, leading to negative net equity.

A comparison of financing patterns in the United States, Germany, and Japan reveals that German and Japanese firms were much more dependent on bank debt than firms in the United States, which are much likely to issue bonds.

Things are changing as corporate bond markets have expanded in Europe as well as in Asia and Latin America.

And a much greater dependence on bank loans outside the US…

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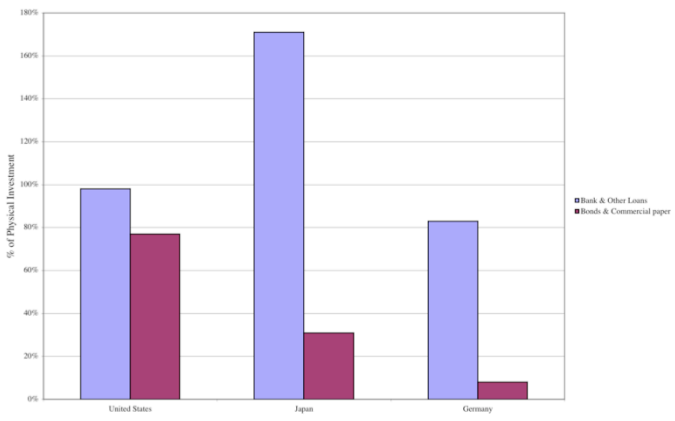
Figure 7.5: Bonds versus Bank Loans - 1990-96



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When borrowing money, US companies have historically had more access to bond markets than firms in other markets which are far more dependent on banks.

Interesting follow up questions:

1.If you can issue bonds, why would you use bank loans instead? (Answer: You may be able to supply proprietary information to a bank that you could not make public…. Special relationships with banks…)

2.In markets where there is no choice and you have to borrow from a bank, would you expect see lower debt ratios? Higher interest rates? (Answer: Not necessarily, but access to debt may be available only to well established firms that have long-standing relationships with banks. Smaller and younger firms may find themselves shut out of the process..)

Assessing the existing financing choices: Disney, Vale, Tata Motors, Baidu & Bookscape

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	Disney	*Vale*	*Tata Motors*	*Baidu*
BV of Interest bearing Debt	$14,288	$48,469	535,914₹	¥17,844
MV of Interest bearing Debt	$13,028	$41,143	477,268₹	¥15,403
Lease Debt	$2,933	$1,248	0.00₹	¥3,051
Type of Debt				
Bank Debt	7.93%	59.97%	62.26%	100.00%
Bonds/Notes	92.07%	40.03%	37.74%	0.00%
Debt Maturity				
<1 year	13.04%	6.08%	0.78%	1.98%
1- 5 years	48.93%	23.12%	30.24%	68.62%
5-10 years	20.31%	29.44%	57.90%	29.41%
10-20 years	4.49%	3.00%	10.18%	0.00%
> 20 years	13.24%	38.37%	0.90%	0.00%
Currency for debt				
Debt in domestic currency	94.51%	34.52%	70.56%	17.90%
Debt in foreign currency	5.49%	65.48%	29.44%	82.10%
Fixed versus Floating rate debt				
Fixed rate debt	94.33%	100.00%	100.00%	94.63%
Floating rate debt	5.67%	0.00%	0.00%	5.37%

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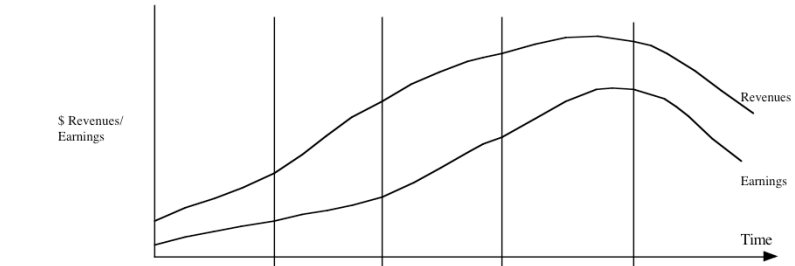
Disney used the corporate bond market much more extensively than the other companies, with 92% of its debt taking the form of bonds, reflecting both its standing as a large market capitalization company and its access to capital markets as a US-based company.

While Disney has the higher proportion of short term debt of the four companies, Vale has the higher proportion of long term debt (reflecting the long lives of its mines).

Disney and Baidu have a little floating rate debt, and none of the companies has convertible debt (currently).

Finally, the bulk of Vale's debt is in foreign currency (which makes sense given its mines are spread across the world) as is Baidu's (which is tougher to rationalize, since it gets almost all of its revenues in China).

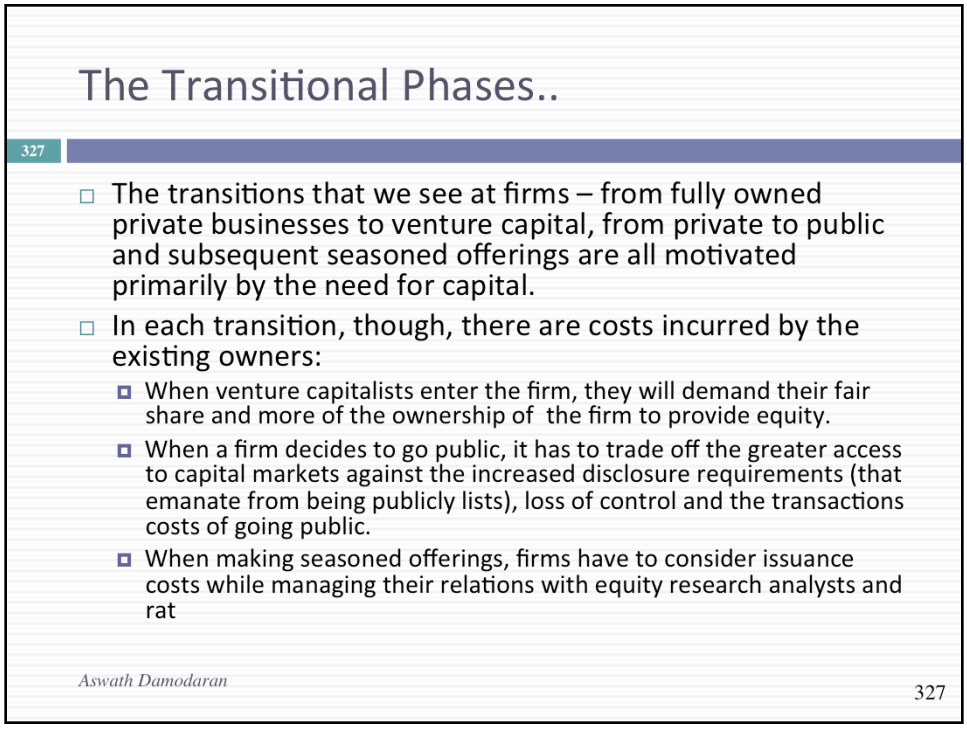
Financing Choices across the life cycle



External funding needs	High, but constrained by infrastructure	High, relative to firm value.	Moderate, relative to firm value.	Declining, as a percent of firm value	Low, as projects dry up.
Internal financing	Negative or low	Negative or low	Low, relative to funding needs	High, relative to funding needs	More than funding needs
External Financing	Owner's Equity Bank Debt	Venture Capital Common Stock	Common stock Warrants Convertibles	Debt	Retire debt Repurchase stock
Growth stage	Stage 1 Start-up	Stage 2 Rapid Expansion	Stage 3 High Growth	Stage 4 Mature Growth	Stage 5 Decline
Financing Transitions	Accessing private equity	Inital Public offering	Seasoned equity issue	Bond issues	

The forms that debt and equity take will change as a firm moves through its lifecycle. Early in the process, equity will take the form of owner's wealth or savings and debt will be bank debt. As the firm evolves, the equity choices will expand first to include venture capital and private equity. When the firm goes public, its choices expand further.

There are three transitional periods: (1) Going from being a private business entirely funded by the owner to accessing the private equity markets (venture capital) (2) Going from private to public with an initial public offering and (3) Public companies making seasoned offerings of debt and equity.



As a firm goes through the lifecycle, there are usually three transition points worth watching…

Note, though, that whether and when these transition points occur can vary widely across firms. For some firms like Google and Amazon, the transition from owner funded businesses to large publicly traded companies was speedy. Other firms, like Cargill and Koch, never make the transition and stay privately owned businesses as they grow, using internal funding to grow over time. Still others never make it to the transitional phases and fade away, go bankrupt or are acquired.

Measuring a firm's financing mix …

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

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

- Debt includes all interest bearing liabilities, short term as well as long term. It should also include other commitments that meet the criteria for debt: contractually pre-set payments that have to be made, no matter what the firm's financial standing.
- Equity can be defined either in accounting terms (as book value of equity) or in market value terms (based upon the current price). The resulting debt ratios can be very different.

The difference between book value and market value debt ratios can give rise to problems. For instance, most published debt ratios are book value debt ratios and many analysts talk about book debt ratios when talking about financial leverage. When firms raise financing, though, they do so in market value terms. When "debt ratios" are used in analysis, it is best to define them up front. For the rest of this analysis, we will debt ratio to mean market value, total debt ratios, with debt including the present value of operating lease commitments.

The Financing Mix Question

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- In deciding to raise financing for a business, is there an optimal mix of debt and equity?
  - If yes, what is the trade off that lets us determine this optimal mix?
    - What are the benefits of using debt instead of equity?
    - What are the costs of using debt instead of equity?
  - If not, why not?

This is the basic question that we will cover in the first part of the analysis.

Costs and Benefits of Debt

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

This summarizes the trade off that we make when we choose between using debt and equity. If the benefits exceed the costs, you should borrow. If not, it is better to use equity.

Tax Benefits of Debt

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- When you borrow money, you are allowed to deduct interest expenses from your income to arrive at taxable income. This reduces your taxes. When you use equity, you are not allowed to deduct payments to equity (such as dividends) to arrive at taxable income.
- The dollar tax benefit from the interest payment in any year is a function of your tax rate and the interest payment:
  - Tax benefit each year = Tax Rate * Interest Payment
- *Proposition 1: Other things being equal, the higher the marginal tax rate of a business, the more debt it will have in its capital structure.*

The tax benefit of debt will be lower if the tax code allows some or all of the cash flows to equity to be tax deductible, as well. For instance, in Germany, dividends paid to stockholders are taxed at a lower rate than retained earnings. In these cases, the tax advantage of debt will be lower.

If you do not pay taxes, debt becomes a lot less attractive. Carnival Cruise Lines, which gets most of its business from the United States pays no taxes because it is domiciled in Liberia. We would expect it to have less debt in its capital structure than a competitor in the US which pays taxes.

Implications:

1.Debt ratios for firms should go up as corporate tax rates increase.

2.Debt ratios of firms incorporated in high-tax locales should be higher than debt ratios of firms in low-tax or tax exempt locales.

The Effects of Taxes

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- You are comparing the debt ratios of real estate corporations, which pay the corporate tax rate, and real estate investment trusts, which are not taxed, but are required to pay 95% of their earnings as dividends to their stockholders. Which of these two groups would you expect to have the higher debt ratios?
  a. The real estate corporations
  b. The real estate investment trusts
  c. Cannot tell, without more information

If I consider only entity-level taxes, I would expect real estate corporations to have more debt. The forced payout of 95% of earnings as dividends by REITs to their stockholders may expose their investors to substantial personal taxes, but the absence of taxes at the entity level will make debt a less attractive option.

In practice, REITs do use debt. On reason might be that they can borrow at a lower rate at the REIT level than at the property level. Another might be that their investors still get tax benefits indirectly, when the REIT borrows money, effectively implying that REITs get tax benefits from debt, at the tax rates of their investors.

Debt adds discipline to management

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- If you are managers of a firm with no debt, and you generate high income and cash flows each year, you tend to become complacent. The complacency can lead to inefficiency and investing in poor projects. There is little or no cost borne by the managers
- Forcing such a firm to borrow money can be an antidote to the complacency. The managers now have to ensure that the investments they make will earn at least enough return to cover the interest expenses. The cost of not doing so is bankruptcy and the loss of such a job.

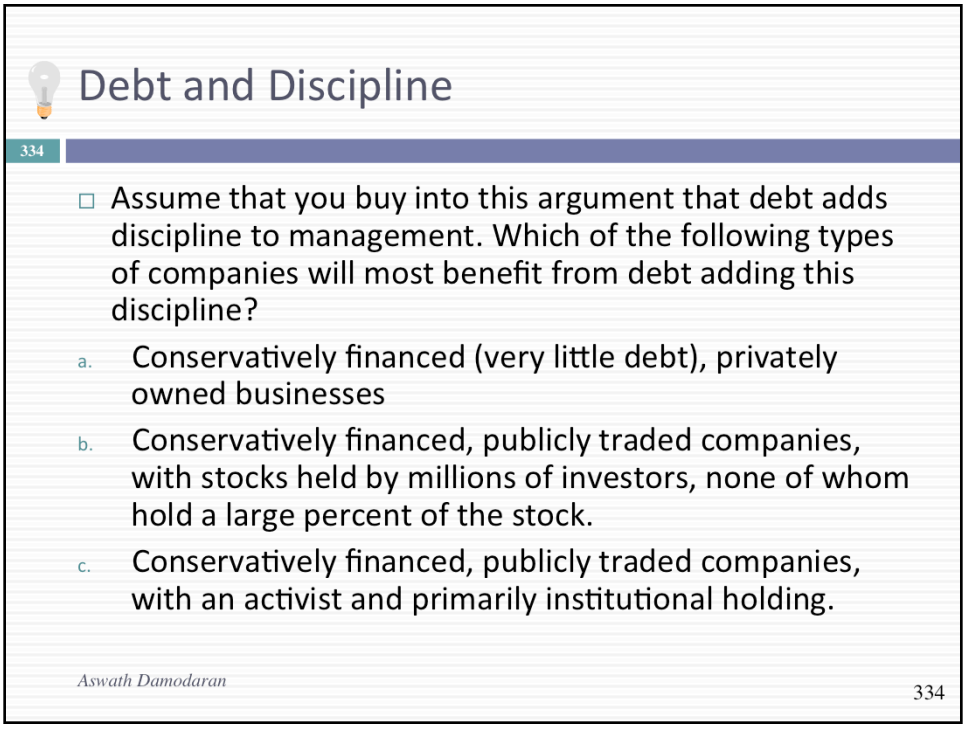
Managers of publicly traded firms with substantial cash flows and little debt are much more protected from the consequences of their mistakes (especially when stockholders are powerless and boards toothless).

Left to themselves, managers (especially lazy ones) would rather run all-equity financed firms with substantial cash reserves.

There are two pieces of evidence that you can point to in support of this proposition.

First, poorly managed, poorly run firms, where managers are not significant stockholders, are more likely to be targeted for leveraged buyouts.

Second, there is evidence of improvements in operating efficiency at firms that increase their debt ratio substantially.



Conservatively financed (Equity financed), publicly traded firms with a wide and diverse stockholding should be the best candidates for debt (with discipline as the argument)

Private firms should have the incentive to be efficient without debt, because the owner/manager has his or her wealth at stake.

Publicly traded firms with activist stockholders (like Michael Price) might not need debt to be disciplined. Investors looking over managers' shoulders will keep them honest.

Bankruptcy Cost

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- The expected bankruptcy cost is a function of two variables--
  - the probability of bankruptcy, which will depend upon how uncertain you are about future cash flows
  - the cost of going bankrupt
    - direct costs: Legal and other Deadweight Costs
    - indirect costs: Costs arising because people perceive you to be in financial trouble
- *Proposition 2: Firms with more volatile earnings and cash flows will have higher probabilities of bankruptcy at any given level of debt and for any given level of earnings.*
- *Proposition 3: Other things being equal, the greater the indirect bankruptcy cost, the less debt the firm can afford to use for any given level of debt.*

Studies (see Warner) seem to indicate that the direct costs of bankruptcy are fairly small (10% or less or firm value)

The indirect cost of going bankrupt comes from the perception that you are in financial trouble, which in turn affects sales and the capacity to raise credit. We would expect indirect bankruptcy costs to vary across firms and be higher at

a. Firms that sell durable products with long lives that require replacement parts and service

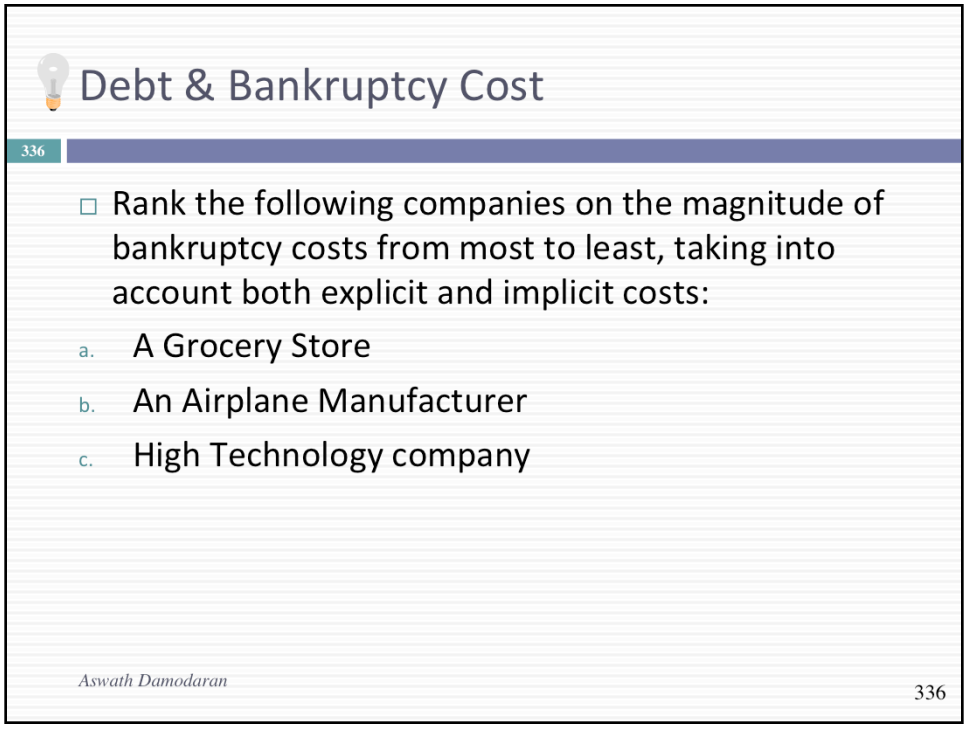
b. Firms that provide goods or services for which quality is an important attribute but is difficult to determine in advance.

c. Firms producing products whose value to customers depends on the services and complementary products supplied by independent companies

As an example, when Apple Computer was perceived to be in financial trouble in early 1997, first-time buyers and businesses stopped buying Apple computers and software firms stopped coming up with upgrades for Mac products.

Similarly, Kmart found that suppliers started demanding payments in 30 days instead of 60 days, when it got into financial trouble.

The probability of bankruptcy should be a function of the predictability (or variability) of earnings.



I would expect a grocery store to have the lowest bankruptcy costs. Customers generally do not consider the rating or default risk of grocery stores when they shop, but they definitely do consider both when placing an order for an airplane.

Technology companies can have high bankruptcy costs, but the costs will vary depending upon what type of product they produce. A PC manufacturer might be affected more than someone who manufacturers software; a company which serves businesses might be affected more than one which creates games for children.

Finally, aircraft manufacturers enter into long term contract with customers (airlines) to deliver and service planes over very long periods. Thus, an aircraft manufacturer that is perceives to be in financial trouble could face huge indirect bankruptcy costs. That will therefore lead them to borrow less than they would have otherwise.

Agency Cost

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- An agency cost arises whenever you hire someone else to do something for you. It arises because your interests(as the principal) may deviate from those of the person you hired (as the agent).
- When you lend money to a business, you are allowing the stockholders to use that money in the course of running that business. Stockholders interests are different from your interests, because
  - You (as lender) are interested in getting your money back
  - Stockholders are interested in maximizing their wealth
- In some cases, the clash of interests can lead to stockholders
  - Investing in riskier projects than you would want them to
  - Paying themselves large dividends when you would rather have them keep the cash in the business.
- *Proposition 4: Other things being equal, the greater the agency problems associated with lending to a firm, the less debt the firm can afford to use.*

Aswath Damodaran

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What is good for equity investors might not be good for bondholders and lenders…. Equity investors describe the projects that they will be funding with debt as safe and secure. However…

A risky project, with substantial upside, may make equity investors happy, but they might cause bondholders, who do not share in the upside, much worse off.

Similarly, paying a large dividend may make stockholders happier but they make lenders less well off.

Lenders recognize this tendency and factor them into their lending by

1. Charging a higher interest rate up front for the loan
2. Putting restrictive covenants on the loan
3. Hire and pay for the monitoring of borrowers

These costs get passed on to borrowers. Thus, the larger the potential agency problem, the less you will borrow.

Debt and Agency Costs

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- Assume that you are a bank. Which of the following businesses would you perceive the greatest agency costs?
  a. A Large Technology firm
  b. A Large Regulated Electric Utility
- Why?

Lenders will probably perceive less agency costs in the regulated utility because:

a. The assets are tangible and easy to monitor (much easier to monitor a power plant than R&D)

b. The regulatory authorities will operate as brake on the investment activities of the utility and thus do the lender's work for them.

With technology firms, not only are earnings unstable and unpredictable, but the assets/investments of these firms are often intangible and difficult to monitor. That will increase agency problems and lead to less debt.

Loss of future financing flexibility

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- When a firm borrows up to its capacity, it loses the flexibility of financing future projects with debt.
- *Proposition 5: Other things remaining equal, the more uncertain a firm is about its future financing requirements and projects, the less debt the firm will use for financing current projects.*

Firms like to preserve flexibility. The value of flexibility should be a function of how uncertain future investment requirements are, and the firm's capacity to raise fresh capital quickly.

Firms with uncertain future needs and the inability to access markets quickly will tend to value flexibility the most, and borrow the least.

What managers consider important in deciding on how much debt to carry...

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- A survey of Chief Financial Officers of large U.S. companies provided the following ranking (from most important to least important) for the factors that they considered important in the financing decisions

Factor	Ranking (0-5)
1. Maintain financial flexibility	4.55
2. Ensure long-term survival	4.55
3. Maintain Predictable Source of Funds	4.05
4. Maximize Stock Price	3.99
5. Maintain financial independence	3.88
6. Maintain high debt rating	3.56
7. Maintain comparability with peer group	2.47

This survey suggests that financial flexibility (which is not explicitly allowed for in the trade off) is valued very highly. What implications does this have for whether firms will borrow as much as the trade off suggests they should?

What is financial flexibility? Flexibility to do what? What do we need to assume about access to capital markets for financial flexibility to have high value? What kinds of firms will value flexibility the most?

•The flexibility that firms want to maintain is the flexibility to be able to fund that once in a lifetime investment that may come along or to protect themselves against that devastating downside risk…

•If we assumed perfect capital markets, you would not need flexibility, which must imply that flexibility is valued most highly by firms with the least access to capital markets (private firms, small firms…)

Debt: Summarizing the trade off

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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.*

Brings together the costs and the benefits of debt, with the implications.

The Trade off for Disney, Vale, Tata Motors and Baidu

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Debt trade off	*Discussion of relative benefits/costs*
Tax benefits	Marginal tax rates of 40% in US (Disney & Bookscape), 32.5% in India (Tata Motors), 25% in China (Baidu) and 34% in Brazil (Vale), but there is an offsetting tax benefit for equity in Brazil (interest on equity capital is deductible).
Added Discipline	The benefits should be highest at Disney, where there is a clear separation of ownership and management and smaller at the remaining firms.
Expected Bankruptcy Costs	Volatility in earnings: Higher at Baidu (young firm in technology), Tata Motors (cyclicality) and Vale (commodity prices) and lower at Disney (diversified across entertainment companies). Indirect bankruptcy costs likely to be highest at Tata Motors, since it's products (automobiles) have long lives and require service and lower at Disney and Baidu.
Agency Costs	Highest at Baidu, largely because it's assets are intangible and it sells services and lowest at Vale (where investments are in mines, highly visible and easily monitored) and Tata Motors (tangible assets, family group backing). At Disney, the agency costs will vary across its business, higher in the movie and broadcasting businesses and lower at theme parks.
Flexibility needs	Baidu will value flexibility more than the other firms, because technology is a shifting and unpredictable business, where future investment needs are difficult to forecast. The flexibility needs should be lower at Disney and Tata Motors, since they are mature companies with well-established investment needs. At Vale, the need for investment funds may vary with commodity prices, since the firm grows by acquiring both reserves and smaller companies. At Bookscape, the difficulty of accessing external capital will make flexibility more necessary.

None of these firms seems like a candidate for a really high debt ratio. With each firm, one or another cost gets in the way.

1.For Disney, the biggest impediments to borrowing more are the variability of its income and the fact that its assets are mostly "intangible" and difficult to monitor.

2.For Vale, it is the variability in commodity prices.

3.For Tata Motors, it is the cross holding structure and the fear that the debt will be channeled to other subsidiaries.

4.For Baidu, it is the fact that it is a young company with small cash flows (relative to market value).

Notwithstanding these issues, I would expect Disney to have more debt than other entertainment companies because it is larger and more diverse than its competitors. I would also expect to see significant debt on both Tata's and Vale's balance sheets, given the tax benefits.

Application Test: Would you expect your firm to gain or lose from using a lot of debt?

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- Considering, for your firm,
  - The potential tax benefits of borrowing
  - The benefits of using debt as a disciplinary mechanism
  - The potential for expected bankruptcy costs
  - The potential for agency costs
  - The need for financial flexibility
- Would you expect your firm to have a high debt ratio or a low debt ratio?
- Does the firm's current debt ratio meet your expectations?

This is just a qualitative analysis. It will not give you a specific optimal debt ratio but provides insight into why the firm may be using the financing mix that it is today.

A Hypothetical Scenario

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Assume that you live in a world where

(a) There are no taxes

(b) Managers have stockholder interests at heart and do what's best for stockholders.

(c) No firm ever goes bankrupt

(d) Equity investors are honest with lenders; there is no subterfuge or attempt to find loopholes in loan agreements.

(e) Firms know their future financing needs with certainty

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

Assume that you super impose these assumptions on the balance sheet on the previous page. The advantages of debt go to zero, as do the disadvantages. Under such a scenario, firms should be indifferent to issuing debt.

The Miller-Modigliani Theorem

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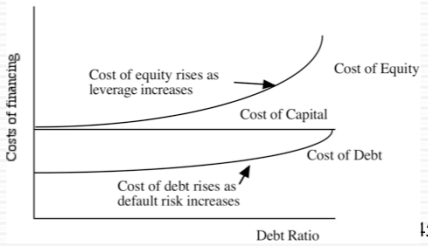
- In an environment, where there are no taxes, default risk or agency costs, capital structure is irrelevant.
- If the Miller Modigliani theorem holds:
  - A firm's value will be determined the quality of its investments and not by its financing mix.
  - The cost of capital of the firm will not change with leverage. As a firm increases its leverage, the cost of equity will increase just enough to offset any gains to the leverage.

Figure 7.9: Cost of Capital in the MM World



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With the assumptions on the previous page:

1. The cost of capital will remain unchanged as the debt ratio changes
2. The value of the firm will not be a function of leverage
3. Investment decisions can be made independently of financing decisions

Note that if we allow for tax benefits, and keep the other assumptions, the optimal debt ratio will go to 100%.

What do firms look at in financing?

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- There are some who argue that firms follow a financing hierarchy, with retained earnings being the most preferred choice for financing, followed by debt and that new equity is the least preferred choice. In particular,
  - Managers value flexibility. Managers value being able to use capital (on new investments or assets) without restrictions on that use or having to explain its use to others.
  - Managers value control. Managers like being able to maintain control of their businesses.
- With flexibility and control being key factors:
  - Would you rather use internal financing (retained earnings) or external financing?
  - With external financing, would you rather use debt or equity?

Firms have fairly strong preferences in terms of where they would like to raise capital. They seem to prefer internal over external sources of capital and new debt over new equity.

Managers make financing decisions, not stockholders. The survey results indicate that what they value will have consequences for what kind of financing gets used. And they seem to value flexibility and control…

What type of financing gives you the most flexibility and the least need to answer to anyone?

-Internal financing or External financing (With internal financing, you do not have to file with the SEC or explain to investors what you plan to do with the money… you may, in hindsight, have to come up with a good story to tell your stockholders about why you retained earnings…)

-New debt or new equity (If you do have to access external financing, it is a closer call. While new debt may come with covenants (which restrict your operating flexibility) and the need to explain your actions to ratings agencies or banks, issuing new equity requires filings with the SEC and the possible loss of control.

Preference rankings long-term finance: Results of a survey

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Ranking	Source	Score
1	Retained Earnings	5.61
2	Straight Debt	4.88
3	Convertible Debt	3.02
4	External Common Equity	2.42
5	Straight Preferred Stock	2.22
6	Convertible Preferred	1.72

Notice that

1. Internal equity is vastly preferred to external equity.
2. Straight debt over convertible debt,
3. Debt will be preferred over new common stock and
4. Preferred stock will be lest preferred (Is that due to debt having a tax advantage?)

And the unsurprising consequences..

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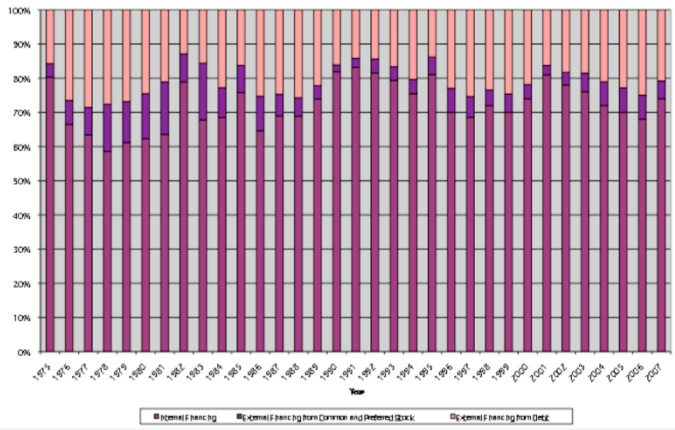
Figure 7.3: External and Internal Financing at US Firms



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At US companies, internal financing has comprised the bulk of financing over much of history. When raising external funds from markets, firms are far more likely to use debt than equity….

Financing Choices

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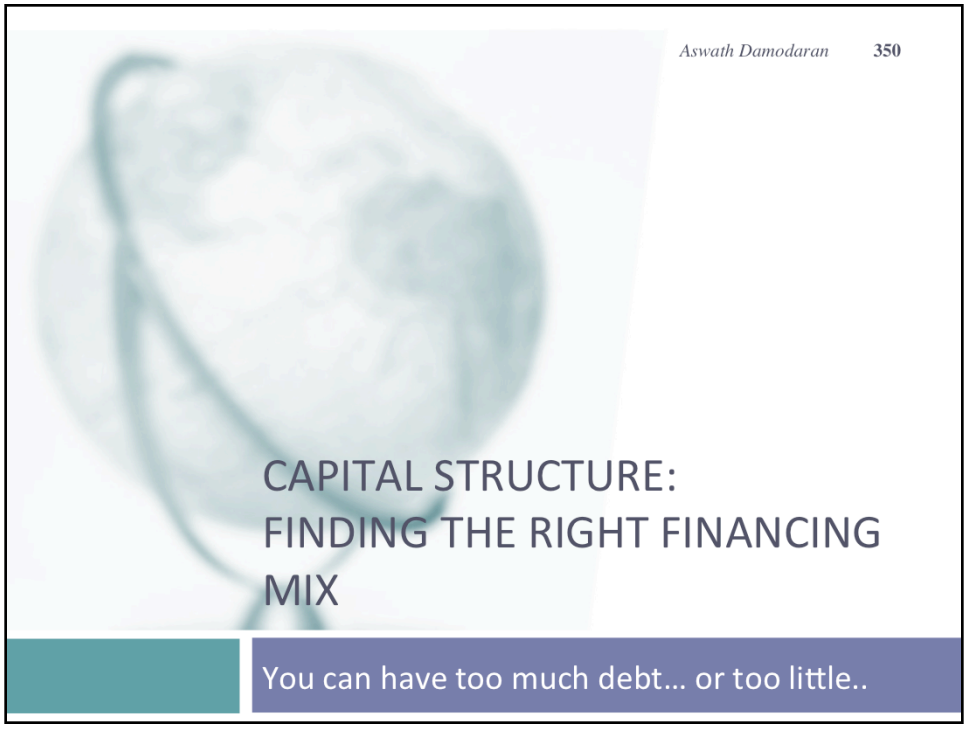
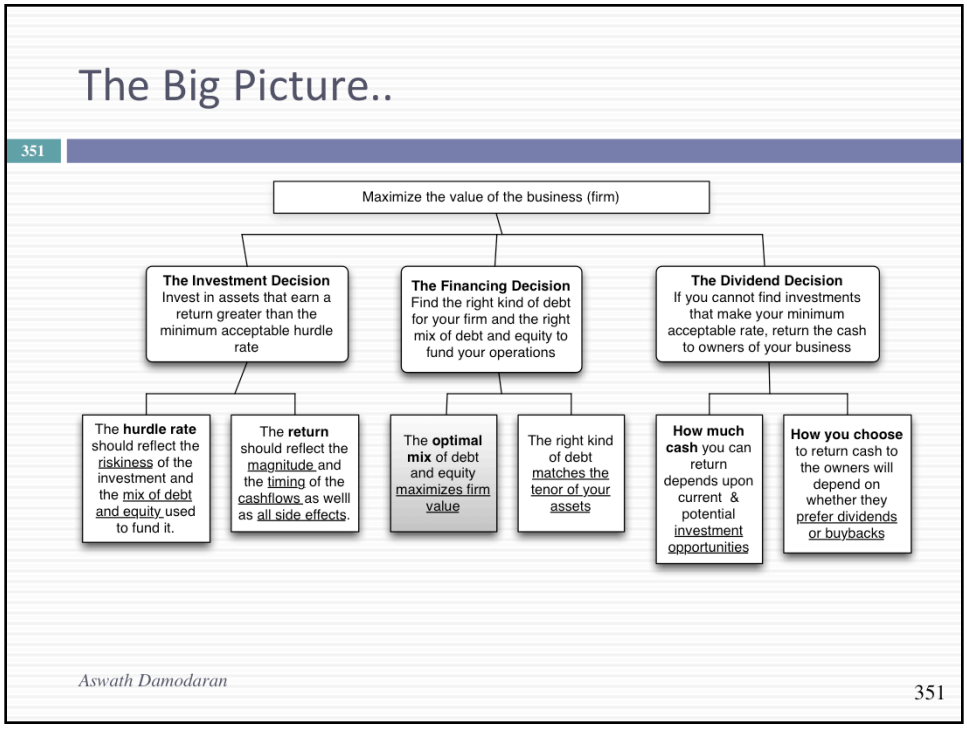
- You are reading the Wall Street Journal and notice a tombstone ad for a company, offering to sell convertible preferred stock. What would you hypothesize about the health of the company issuing these securities?
  a. Nothing
  b. Healthier than the average firm
  c. In much more financial trouble than the average firm

I would expect the firm to be in much more financial trouble than the average firm. Why else would it use convertible preferred stock when it could have used an alternate source of financing?

The stock price response to the issue of securities seems to mirror this financing hierarchy, with new bond issues eliciting more positive stock price responses than new stock issues.



While we can talk about the trade off between debt and equity in qualitative terms, ultimately we have to get down to the details. In this section, we will look at approaches that can be used to estimate the right debt ratio for a firm.



Is there an optimal mix? And can we find it for a given firm? Time to get down to pragmatic questions.

Pathways to the Optimal

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1. The Cost of Capital Approach: The optimal debt ratio is the one that minimizes the cost of capital for a firm.
2. The Enhanced Cost of Capital approach: The optimal debt ratio is the one that generates the best combination of (low) cost of capital and (high) operating income.
3. The Adjusted Present Value Approach: The optimal debt ratio is the one that maximizes the overall value of the firm.
4. The Sector Approach: The optimal debt ratio is the one that brings the firm closes to its peer group in terms of financing mix.
5. The Life Cycle Approach: The optimal debt ratio is the one that best suits where the firm is in its life cycle.

We will look at all five approaches, though they may yield different results.

I. The Cost of Capital Approach

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- Value of a Firm = Present Value of Cash Flows to the Firm, discounted back at the cost of capital.
- If the cash flows to the firm are held constant, and the cost of capital is minimized, the value of the firm will be maximized.

This is the conventional valuation model for a firm.

If the cash flows are the same, and the discount rate is lowered, the present value has to go up. (The key is that cash flows have to remain the same. If this is not true, then minimizing cost of capital may not maximize firm value)

Measuring Cost of Capital

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- Recapping our discussion of cost of capital:
- The cost of debt is the market interest rate that the firm has to pay on its long term borrowing today, net of tax benefits. It will be a function of:
  (a) The long-term riskfree rate
  (b) The default spread for the company, reflecting its credit risk
  (c) The firm's marginal tax rate
- The cost of equity reflects the expected return demanded by marginal equity investors. If they are diversified, only the portion of the equity risk that cannot be diversified away (beta or betas) will be priced into the cost of equity.
- The cost of capital is the cost of each component weighted by its relative market value.

Cost of capital = Cost of equity (E/(D+E)) + After-tax cost of debt (D/(D+E))

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The cost of equity reflects the non-diversifiable risk in a business and the cost of debt is the rate at which a business can borrow today. In a sense, this is what it would cost you to refinance the entire firm from scratch today.

The cost of capital is the weighted average of the cost of all the different sources of financing.

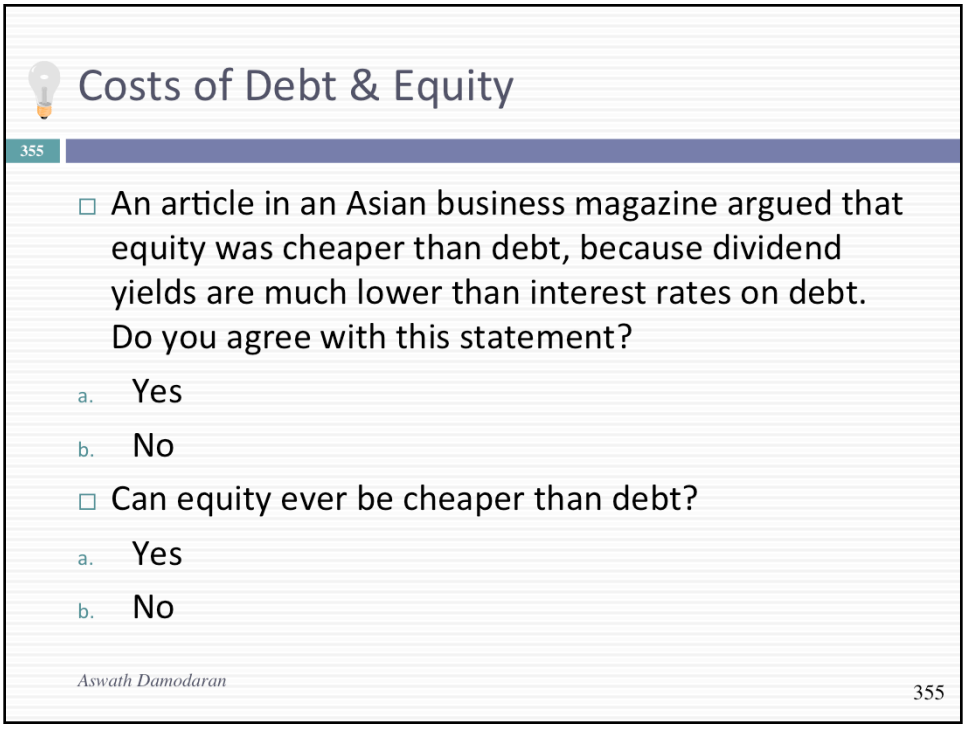
Note that there are only two components in the computation – debt and equity. But what about hybrids?

a. Convertible debt: It is best to break convertible debt into its debt and equity components, with the bond portion being treated as debt and the conversion option as equity.

b. Preferred stock is messier. It is not debt (because preferred dividends are not tax deductible) and not equity (because preferred dividends are fixed). There are two ways of dealing with it:

-Treat it as a third item on the cost of capital computation, with its own cost. The simplest measure of this cost is the preferred dividend yield. (Preferred dividend/Preferred stock price)

-Treat it as debt but gross up the amount to reflect the absence of tax advantages on preferred dividends. Thus, $ 100 million in preferred stock, when the marginal tax rate is 40% can be grossed up as follows:



No. Dividend yields are only a portion of what you have to deliver to equity investors to keep them satisfied (To which, the Asian manager might well respond: What if they are not satisfied? What can the do to me? The more power stockholders have over managers, the more likely it is that they will subscribe to viewing cost of equity as including dividend yield and price appreciation)

Equity can never be cheaper than debt for any firm at any stage in its life cycle, since equity investors always stand behind debt holders in line when it comes to claims on cash flows (each year) and on assets (on liquidation). I know.. I know.. There is one exception. If you have a company with a negative or very low beta, its cost of equity may be so low that it is lower than the default-risk adjusted cost of debt. Such a company should never borrow money in the first place, making the exception moot.

Applying Cost of Capital Approach: The Textbook Example

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Assume the firm has $200 million in cash flows, expected to grow 3% a year forever.

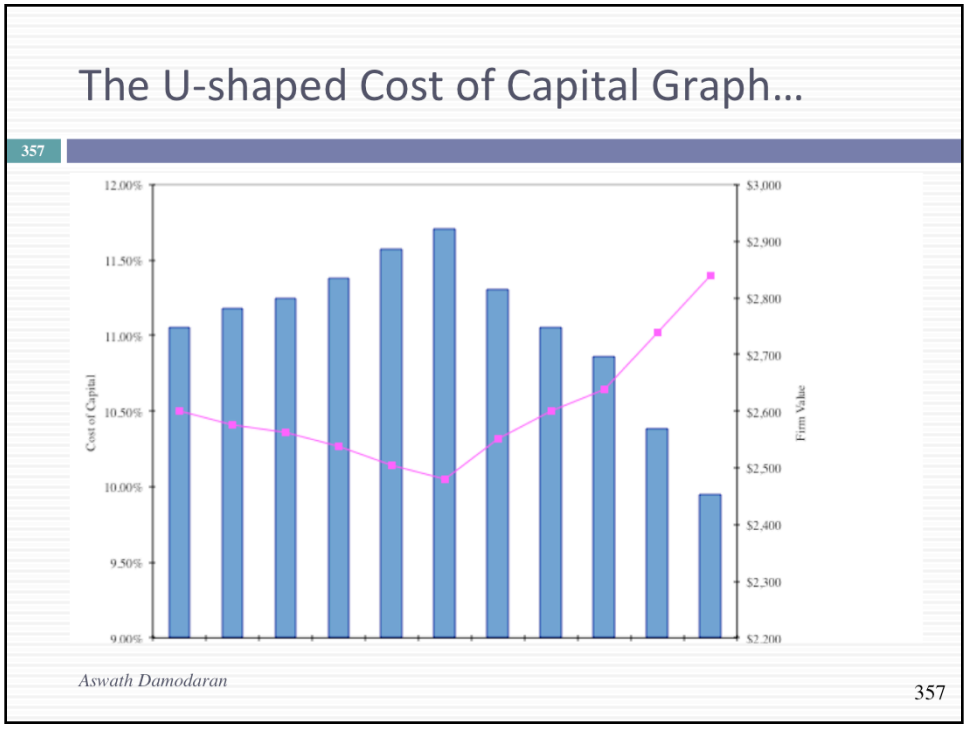
D/(D+E)	Cost of Equity	After-tax Cost of Debt	Cost of Capital	Firm Value
0	10.50%	4.80%	10.50%	$2,747
10%	11.00%	5.10%	10.41%	$2,780
20%	11.60%	5.40%	10.36%	$2,799
30%	12.30%	5.52%	10.27%	$2,835
40%	13.10%	5.70%	10.14%	$2,885
50%	14.50%	6.10%	10.30%	$2,822
60%	15.00%	7.20%	10.32%	$2,814
70%	16.10%	8.10%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

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

This is a simple example, where both the costs of debt and equity are given. The firm has cash flows, before debt and after taxes and reinvestment, of $200 million and is in stable growth (growing 3% a year). Note that both increase as the debt ratio goes up, but the cost of capital becomes lower at least initially as you take on more debt (because you are substituting in cheaper debt for more expensive equity)

At 40%, the cost of capital is minimized. It is the optimal debt ratio.

To get firm value, we used the same cash flow ($200 million) and same growth rate and changed the cost of capital.



Really adds nothing to the previous page.. But it is in every text book… the famous U-shaped cost of capital graph..

If you had this graph available to you, the optimal capital structure would be obvious. In most firms, all we know at the time we begin the analysis is one point on the graph - the current cost of capital. Our challenge is fleshing out the rest of the graph.

Current Cost of Capital: Disney

- The beta for Disney's stock in November 2013 was 1.0013. The T. bond rate at that time was 2.75%. Using an estimated equity risk premium of 5.76%, we estimated the cost of equity for Disney to be 8.52%:

  Cost of Equity = 2.75% + 1.0013(5.76%) = 8.52%

- Disney's bond rating in May 2009 was A, and based on this rating, the estimated pretax cost of debt for Disney is 3.75%. Using a marginal tax rate of 36.1, the after-tax cost of debt for Disney is 2.40%.

  After-Tax Cost of Debt = 3.75% (1 – 0.361) = 2.40%

- The cost of capital was calculated using these costs and the weights based on market values of equity (121,878) and debt (15.961):

  Cost of capital = $= 8.52\% \frac{121,878}{(15,961+121,878)} + 2.40\% \frac{15,961}{(15,961+121,878)} = 7.81\%$

The one point we do know for Disney…

This reproduces the current cost of capital computation for Disney, using market value weights for both debt and equity, the cost of equity (based upon the bottom-up beta) and the cost of debt (based upon the bond rating)

The market value of debt is estimated by estimating the present value of total interest payments and face value at the current cost of debt.

One way to frame the capital structure question: Is there a mix of debt and equity at which Disney's cost of capital will be lower than 7.81%?

Mechanics of Cost of Capital Estimation

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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.

The basic inputs for computing cost of capital are cost of equity and cost of debt. This summarizes the basic approach we will use to estimate each.

Laying the groundwork: 1. Estimate the unlevered beta for the firm

- **The Regression Beta**: One approach is to use the regression beta (1.25) and then unlever, using the average debt to equity ratio (19.44%) during the period of the regression to arrive at an unlevered beta.

  Unlevered beta = = 1.25 / (1 + (1 - 0.361)(0.1944))= 1.1119

- **The Bottom up Beta**: Alternatively, we can back to the source and estimate it from the betas of the businesses.

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**	**100.00%**

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Since we will be changing the debt ratio, we need to estimate the beta of Disney's businesses… We can then use this unlevered beta to get to the beta at every debt ratio.

2. Get Disney's current financials…

	Most recent fiscal year (2012-13)	Prior year
Revenues	$45,041	$42,278
EBITDA	$10,642	$10,850
Depreciation & Amortization	$2,192	$1,987
EBIT	$9,450	$8,863
Interest Expenses	$349	$564
EBITDA (adjusted for leases)	$12,517	$11,168
Depreciation (adjusted for leases)	$ 2,485	$2,239
EBIT (adjusted for leases)	$10,032	$8,929
Interest Expenses (adjusted for leases)	$459	$630

This is a key step, Since you are determining your firm's capacity to borrow long term, this is the stage at which you can modify these numbers to reflect the firm's long term earning capacity rather than the vagaries of a single year of operations. With commodity companies, you may choose to use an average income across a commodity price cycle.

These numbers also reflect our efforts to bring leases into the financial expense column and to treat lease commitments as debt.

I. Cost of Equity

Debt to Capital Ratio	D/E Ratio	Levered Beta	Cost of Equity
0%	0.00%	0.9239	8.07%
10%	11.11%	0.9895	8.45%
20%	25.00%	1.0715	8.92%
30%	42.86%	1.1770	9.53%
40%	66.67%	1.3175	10.34%
50%	100.00%	1.5143	11.48%
60%	150.00%	1.8095	13.18%
70%	233.33%	2.3016	16.01%
80%	400.00%	3.2856	21.68%
90%	900.00%	6.2376	38.69%

Levered Beta = 0.9239 (1 + (1- .361) (D/E))
Cost of equity = 2.75% + Levered beta * 5.76%

This reproduces the levered beta, using the formula developed during the risk and return section. The unlevered beta of 1.0674 is the bottom-up unlevered beta.

$Beta_{Levered}$ = Unlevered Beta (1 + (1-t) (Debt/Equity Ratio)) In calculating the levered beta in this table, we assumed that all market risk is borne by the equity investors; this may be unrealistic especially at higher levels of debt. We will also consider an alternative estimate of levered betas that apportions some of the market risk to the debt:

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

The beta of debt is based upon the rating of the bond and is estimated by regressing past returns on bonds in each rating class against returns on a market index. The levered betas estimated using this approach will generally be lower than those estimated with the conventional model

Estimating Cost of Debt

Start with the market value of the firm = = 121,878 + $15,961 = $137,839 million

D/(D+E)	0.00%	10.00%	Debt to capital
D/E	0.00%	11.11%	D/E = 10/90 = .1111
$ Debt	$0	$13,784	10% of $137,839
EBITDA	$12,517	$12,517	Same as 0% debt
Depreciation	$ 2,485	$ 2,485	Same as 0% debt
EBIT	$10,032	$10,032	Same as 0% debt
Interest	$0	$434	Pre-tax cost of debt * $ Debt
Pre-tax Int. cov	∞	23.10	EBIT/ Interest Expenses
Likely Rating	AAA	AAA	From Ratings table
Pre-tax cost of debt	3.15%	3.15%	Riskless Rate + Spread

This is a manual computation of the cost of debt. Note the circularity in the argument, since the interest expense is needed to compute the rating, and the rating is needed to compute the cost of debt.

To get around the circularity, I start the 10% debt ratio calculation assuming that my cost of debt is the same as it was at 0% (which is 4.75%) and that my starting firm value (market value of equity + debt) remains my firm value. While neither assumption is realistic, we can revisit these numbers in subsequent iterations, if necessary.

We assume that whatever is borrowed is used to buy back equity, and that the operating assets of the firm remain unchanged (EBITDA and EBIT don't change…). This allows us to isolate the effect of the recapitalization.

The Ratings Table

Interest coverage ratio is	*Rating is*	*Spread is*	*Interest rate*
> 8.50	Aaa/AAA	0.40%	3.15%
6.5 – 8.5	Aa2/AA	0.70%	3.45%
5.5 – 6.5	A1/A+	0.85%	3.60%
4.25 – 5.5	A2/A	1.00%	3.75%
3 – 4.25	A3/A-	1.30%	4.05%
2.5 -3	Baa2/BBB	2.00%	4.75%
2.25 –2.5	Ba1/BB+	3.00%	5.75%
2 – 2.25	Ba2/BB	4.00%	6.75%
1.75 -2	B1/B+	5.50%	8.25%
1.5 – 1.75	B2/B	6.50%	9.25%
1.25 -1.5	B3/B-	7.25%	10.00%
0.8 -1.25	Caa/CCC	8.75%	11.50%
0.65 – 0.8	Ca2/CC	9.50%	12.25%
0.2 – 0.65	C2/C	10.50%	13.25%
<0.2	D2/D	12.00%	14.75%

T.Bond rate =2.75%

These are interest coverage ratio/ratings classes for large manufacturing firms (Market cap > $ 5 billion) and the default spreads at the time of the analysis. This is the default spread over and above the long term (10 year) treasury bond rate at the time of this analysis.

These default spreads can be obtained in one of two ways:

a. Getting a sampling of liquid bonds within each ratings class and averaging out their yields to maturity.

b. Finding a source that provides default spreads by ratings class (bondsonline.com used to provide these for free but now requires a fee)

The interest coverage ratio needs to be much higher for smaller firms to get similar ratings. (See ratings.xls spreadsheet)

Special cases:

1. If you have no interest expenses, your interest coverage ratio will be infinite: AAA rating (does not matter anyway, since you probably have no debt)
2. 2. If you have negative operating income, interest coverage ratio is negative: D rating. You may want to modify by using average operating income over last few years.

A Test: Can you do the 30% level?

		Iteration 1 (Debt @AAA rate)	*Iteration 2 (Debt @AA rate)*
D/(D + E)	*20.00%*	*30.00%*	*30.00%*
D/E	25.00%		
$ Debt	$27,568		
EBITDA	$12,517		
Depreciation	$2,485		
EBIT	$10,032		
Interest expense	$868		
Interest coverage ratio	11.55		
Likely rating	AAA		
Pretax cost of debt	3.15%		

You have to start by assuming the AAA rate but you will end up with a rating that is different (AA)

You can redo the analysis using the AA rate and you can stop because you end up with the same rating at the end. (Sometimes you will need a third iteration).

Iteration 1 *Iteration 2*

(Debt @AAA rate) *(Debt @AA rate)*

		Iteration 1	**Iteration 2**
		(Debt @AAA rate)	**(Debt @AA rate)**
D/(D + E)	20.00%	30.00%	30.00%
D/E	25.00%	42.86%	42.86%
$ Debt	$12,375	$18,563	$18,563
EBITDA	$8,422	$8,422	$8,422
Depreciation	$1,593	$1,593	$1,593
EBIT	$6,829	$6,829	$6,829
Interest	$588	18563*.0475=$881	18563*.0525 =$974
Pretax int. cov	11.62	7.74	7.01
Likely rating	AAA	AA	AA

Likely rating AAA AA AA

Bond Ratings, Cost of Debt and Debt Ratios

Debt Ratio	$ Debt	Interest Expense	Interest Coverage Ratio	Bond Rating	Pre-tax cost of debt	Tax rate	After-tax cost of debt
0%	$0	$0	∞	Aaa/AAA	3.15%	36.10%	2.01%
10%	$13,784	$434	23.10	Aaa/AAA	3.15%	36.10%	2.01%
20%	$27,568	$868	11.55	Aaa/AAA	3.15%	36.10%	2.01%
30%	$41,352	$1,427	7.03	Aa2/AA	3.45%	36.10%	2.20%
40%	$55,136	$2,068	4.85	A2/A	3.75%	36.10%	2.40%
50%	$68,919	$6,892	1.46	B3/B-	10.00%	36.10%	6.39%
60%	$82,703	$9,511	1.05	Caa/CCC	11.50%	36.10%	7.35%
70%	$96,487	$11,096	0.90	Caa/CCC	11.50%	32.64%	7.75%
80%	$110,271	$13,508	0.74	Ca2/CC	12.25%	26.81%	8.97%
90%	$124,055	$16,437	0.61	C2/C	13.25%	22.03%	10.33%

This is the completed schedule of interest coverage ratios, ratings and costs of debt at different debt ratios ranging up to 90%.

It is significant that EBITDA not change as the debt ratio goes up. The reason is that the new debt is not used to make the firm larger by taking new projects, but to buy back equity. (This isolates the effect of the financing decision on the value of the firm)

We are being simplistic in assuming that the interest coverage ratio solely determines the ratings. We could use more than one ratio, create a consolidated score (like the Altman Z score) and make the rating a function of this score.

Note that the effective tax rate decreases after the 70% debt ratio. That is because we have insufficient income to cover the entire interest expense beyond that point. (EBIT < Interest Expenses) We therefore lose some of the tax advantage of borrowing.

Stated versus Effective Tax Rates

- You need taxable income for interest to provide a tax savings. Note that the EBIT at Disney is $10,032 million. As long as interest expenses are less than $10,032 million, interest expenses remain fully tax-deductible and earn the 36.1% tax benefit. At an 60% debt ratio, the interest expenses are $9,511 million and the tax benefit is therefore 36.1% of this amount.
- At a 70% debt ratio, however, the interest expenses balloon to $11,096 million, which is greater than the EBIT of $10,032 million. We consider the tax benefit on the interest expenses up to this amount:
  - Maximum Tax Benefit = EBIT * Marginal Tax Rate = $10,032 million * 0.361 = $ 3,622 million
  - Adjusted Marginal Tax Rate = Maximum Tax Benefit/Interest Expenses = $3,622/$11,096 = 32.64%

We are being conservative. The interest that is not tax deductible can be carried forward and will probably earn some tax benefit in future periods.

Given that this is a permanent change in capital structure, however, it seems to be more conservative to just look at the interest expenses that provide a tax benefit in the current period.

Disney's cost of capital schedule…

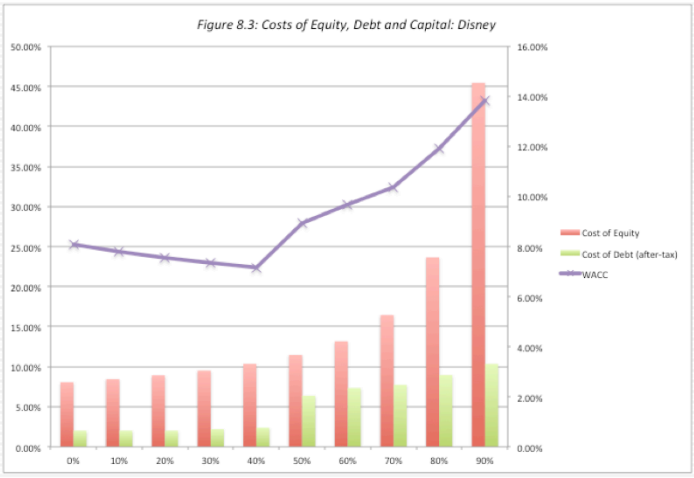
Debt Ratio	Beta	Cost of Equity	Cost of Debt (after-tax)	WACC
0%	0.9239	8.07%	2.01%	8.07%
10%	0.9895	8.45%	2.01%	7.81%
20%	1.0715	8.92%	2.01%	7.54%
30%	1.1770	9.53%	2.20%	7.33%
40%	1.3175	10.34%	2.40%	7.16%
50%	1.5143	11.48%	6.39%	8.93%
60%	1.8095	13.18%	7.35%	9.68%
70%	2.3762	16.44%	7.75%	10.35%
80%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

Summarizes the cost of equity and debt from prior pages, as well as the cost of capital at different debt ratios.

If the objective is to minimize cost of capital, it occurs at 40%, or more precisely, somewhere around 40%.

This will maximize firm value, if operating cashflow (EBITDA) is unaffected by changes in leverage and the consequent changes in ratings. (In other words, we are assuming no indirect bankruptcy costs… If we did, the optimal might be affected, especially if it is at low rating).

Disney: Cost of Capital Chart



The cost of capital is minimized at 40% but notes that the cost of capital does not rise smoothly. Note that surge in cost of capital just beyond 40%. This is not unusual and represents a tipping point, where you go from being comfortable with your debt to pushing the limit…. Interest coverage ratios decrease, pushing up the cost of debt, pushing up interest expenses, pushing down interest coverage ratios, thus creating a spiral.

For those who may still be fixated on the assuming that we made that debt has a zero beta, when computing levered betas, we re-estimated the optimal allowing debt to have a beta (We backed into a beta for debt by taking the default spread at debt rating, assuming that 25% of that spread was due to market risk and estimating an imputed beta)

Debt Ratio	Beta of Equity	Beta of Debt	Cost of Equity	Cost of Debt (after-tax)	Cost of capital
0%	0.73	0.05	7.90%	2.95%	7.90%
10%	0.78	0.05	8.18%	2.95%	7.66%
20%	0.84	0.05	8.53%	2.95%	7.42%
30%	0.91	0.07	8.95%	3.26%	7.24%
40%	0.99	0.10	9.46%	3.72%	7.16%
50%	1.11	0.13	10.16%	4.03%	7.10%
60%	1.28	0.00	11.18%	4.34%	7.08%
70%	1.28	0.35	11.19%	7.44%	8.57%
80%	1.52	0.42	12.61%	8.37%	9.22%
90%	2.60	0.42	19.10%	8.84%	9.87%

Disney: Cost of Capital Chart: 1997

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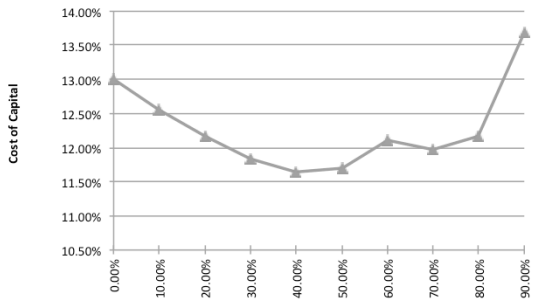

Note the kink in the cost of capital graph at 60% debt. What is causing it?

Aswath Damodaran

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Note the kink in the cost of capital curve at 70%. This occurs largely because the cost of debt in this calculation is discontinuous. It changes only when the rating changes. In reality, the cost of debt, even within a ratings class, will vary depending upon where in the class the firm falls (low AA rated versus high AA rated).

We can make the cost of debt a continuous function of default risk or interest coverage ratios.

The cost of capital approach suggests that Disney should do the following…

- Disney currently has $15.96 billion in debt. The optimal dollar debt (at 40%) is roughly $55.1 billion. Disney has excess debt capacity of 39.14 billion.
- To move to its optimal and gain the increase in value, Disney should borrow $ 39.14 billion and buy back stock.
- Given the magnitude of this decision, you should expect to answer three questions:
  - Why should we do it?
  - What if something goes wrong?
  - What if we don't want (or cannot) buy back stock and want to make investments with the additional debt capacity?

The cost of capital approach holds investments constant and changes the financial mix to see the effect on the cost of capital. Consequently, the recommendation that flows out of it is a recapitalization: borrow money and buy back stock to increase the debt ratio or issue stock and repay debt to lower the debt ratio.

Why should we do it? Effect on Firm Value – Full Valuation

Step 1: Estimate the cash flows to Disney as a firm

EBIT (1 – Tax Rate) = 10,032 (1 – 0.361) =	$6,410
+ Depreciation and amortization =	$2,485
– Capital expenditures =	$5,239
– Change in noncash working capital	$0
Free cash flow to the firm =	$3,657

- Step 2: Back out the implied growth rate in the current market value

Current enterprise value = $121,878 + 15,961 - 3,931 = 133,908

Value of firm = $ 133,908 = $\frac{FCFF_0(1+g)}{(\text{Cost of Capital} - g)} = \frac{3,657(1+g)}{(.0781 - g)}$

Growth rate = (Firm Value * Cost of Capital – CF to Firm)/(Firm Value + CF to Firm)

= (133,908* 0.0781 – 3,657)/(133,908+ 3,657) = 0.0494 or 4.94%

- Step 3: Revalue the firm with the new cost of capital
  - Firm value = $\frac{FCFF_0(1+g)}{(\text{Cost of Capital} - g)} = \frac{3,657(1.0494)}{(.0716 - 0.0484)} = \$172,935 \text{ million}$
  - Increase in firm value = $172,935 - $133,908 = $39,027 million

We are assuming that the firm is correctly valued now, not because of any belief in market efficiency but to isolate the effect of changing the cost of capital. In other words, whatever the market's expectations are now (realistic or unrealistic), those expectations stay unchanged as we move from the old to the new capital structure.

This approach will tend to break down with growth or money losing companies because the valuation models you will need for those are far more complicated.

Effect on Value: Incremental approach

- In this approach, we start with the current market value and isolate the effect of changing the capital structure on the cash flow and the resulting value.

Enterprise Value before the change = $133,908 million

Cost of financing Disney at existing debt ratio = $ 133,908 * 0.0781 = $10,458 million

Cost of financing Disney at optimal debt ratio = $ 133,908 * 0.0716 = $ 9,592 million

Annual savings in cost of financing = $10,458 million – $9,592 million = $866 million

$$\text{Increase in Value} = \frac{\text{Annual Savings next year}}{(\text{Cost of Capital} - g)} = \frac{\$866}{(0.0716 - 0.0275)} = \$19,623 \text{ million}$$

Enterprise value after recapitalization

= Existing enterprise value + PV of Savings = $133,908 + $19,623 = $153,531 million

Aswath Damodaran

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The reduction in the cost of capital translates into annual savings. Most of these savings are implicit, being savings in the cost of equity. Thus, the firm's accounting earnings will not reflect these savings directly.

These savings can be converted into a present value by discounting back at the new cost of capital.

It is more realistic to assume growth in firm value. A simple way to estimate what the current growth attributed to the firm by the market is to estimate it using the firm value today, the free cash flow to the firm and the current cost of capital.

Note that the simple valuation formula used above assumes stable growth forever. For high growth firms, this formula will yield an implied growth rate that is too high (It will be very close to the cost of capital). In those cases, it is better to put a cap on the growth rate of around the risk free rate.

In this case, maximizing firm value also maximizes stock price, because we assume that

Debt is refinanced at current market rates, thus protecting bondholders

Markets are rational and efficient.

From firm value to value per share: The Rational Investor Solution

- Because the increase in value accrues entirely to stockholders, we can estimate the increase in value per share by dividing by the total number of shares outstanding (1,800 million).
  - Increase in Value per Share = $19,623/1800 = $ 10.90
  - New Stock Price = $67.71 + $10.90= $78.61
- Implicit in this computation is the assumption that the increase in firm value will be spread evenly across both the stockholders who sell their stock back to the firm and those who do not and that is why we term this the "rational" solution, since it leaves investors indifferent between selling back their shares and holding on to them.

If investors are rational, the price on the buyback should be such that investors are indifferent between selling back their shares and holding on to them. At $78.61, that will happen.

The more general solution, given a buyback price

- Start with the buyback price and compute the number of shares outstanding after the buyback:
  - Increase in Debt = Debt at optimal – Current Debt
  - # Shares after buyback = # Shares before – $\frac{\text{Increase in Debt}}{\text{Share Price}}$
- Then compute the equity value after the recapitalization, starting with the enterprise value at the optimal, adding back cash and subtracting out the debt at the optimal:
  - Equity value after buyback = Optimal Enterprise value + Cash – Debt
- Divide the equity value after the buyback by the post-buyback number of shares.
  - Value per share after buyback = Equity value after buyback/ Number of shares after buyback

In the more general scenario, you are looking at the division of spoils between those who sell their shares back and those who stay on as stockholders.

Let's try a price: What if can buy shares back at the old price ($67.71)?

- Start with the buyback price and compute the number of shares outstanding after the buyback
  - Debt issued = $ 55,136 - $15,961 = $39,175 million
  - # Shares after buyback = 1800 - $39,175/$67.71 = 1221.43 m
- Then compute the equity value after the recapitalization, starting with the enterprise value at the optimal, adding back cash and subtracting out the debt at the optimal:
  - Optimal Enterprise Value = $153,531
  - Equity value after buyback = $153,531 + $3,931– $55,136 = $102,326
- Divide the equity value after the buyback by the post-buyback number of shares.
  - Value per share after buyback = $102,326/1221.43 = $83.78

This is the best case scenario for those who stay on as stockholders, since they claim the entire surplus.

Back to the rational price ($78.61): Here is the proof

- Start with the buyback price and compute the number of shares outstanding after the buyback
  - # Shares after buyback = 1800 - $39,175/$78.61 = 1301.65 m
- Then compute the equity value after the recapitalization, starting with the enterprise value at the optimal, adding back cash and subtracting out the debt at the optimal:
  - Optimal Enterprise Value = $153,531
  - Equity value after buyback = $153,531 + $3,931– $55,136 = $102,326
- Divide the equity value after the buyback by the post-buyback number of shares.
  - Value per share after buyback = $102,326/1301.65 = $78.61

Proof that the $78.61 leaves everyone equally well off.

Try different prices and see how the increase in value is apportioned between the groups.

In fact, try estimating the buyback price at which the entire value increase goes to those who sell their shares back.

2. What if something goes wrong? The Downside Risk

- Sensitivity to Assumptions

  A. "What if" analysis

  The optimal debt ratio is a function of our inputs on operating income, tax rates and macro variables. We could focus on one or two key variables – operating income is an obvious choice – and look at history for guidance on volatility in that number and ask what if questions.

  B. "Economic Scenario" Approach

  We can develop possible scenarios, based upon macro variables, and examine the optimal debt ratio under each one. For instance, we could look at the optimal debt ratio for a cyclical firm under a boom economy, a regular economy and an economy in recession.

- Constraint on Bond Ratings/ Book Debt Ratios

  Alternatively, we can put constraints on the optimal debt ratio to reduce exposure to downside risk. Thus, we could require the firm to have a minimum rating, at the optimal debt ratio or to have a book debt ratio that is less than a "specified" value.

This analysis is based upon the firm continuing as a going concern. To the extent that more debt can put this survival at risk, it is important to do "what-if" analyses or build in survival constraints into the analysis.

Disney's Operating Income: History

Year	EBIT	% Change in EBIT	Year	EBIT	% Change in EBIT
1987	$756		2001	$2,832	12.16%
1988	$848	12.17%	2002	$2,384	-15.82%
1989	$1,177	38.80%	2003	$2,713	13.80%
1990	$1,368	16.23%	2004	$4,048	49.21%
1991	$1,124	-17.84%	2005	$4,107	1.46%
1992	$1,287	14.50%	2006	$5,355	30.39%
1993	$1,560	21.21%	2007	$6,829	27.53%
1994	$1,804	15.64%	2008	$7,404	8.42%
1995	$2,262	25.39%	2009	$5,697	-23.06%
1996	$3,024	33.69%	2010	$6,726	18.06%
1997	$3,945	30.46%	2011	$7,781	15.69%
1998	$3,843	-2.59%	2012	$8,863	13.91%
1999	$3,580	-6.84%	2013	$9,450	6.62%
2000	$2,525	-29.47%			

Standard deviation in % change in EBIT = 19.17%

Recession	*Decline in Operating Income*
2009	Drop of 23.06%
2002	Drop of 15.82%
1991	Drop of 22.00%
1981-82	Increased by 12%
Worst Year	Drop of 29.47%

These are percentage changes in operating income at Disney.

Disney: Safety Buffers?

EBIT drops by	EBIT	Optimal Debt ratio
0%	$10,032	40%
10%	$9,029	40%
20%	$8,025	40%
30%	$7,022	40%
40%	$6,019	30%
50%	$5,016	30%
60%	$4,013	20%

Disney's optimal debt ratio is robust and survives up to a 30% drop in EBIT, which is worse than their worst year in the last three decades.

Constraints on Ratings

- Management often specifies a 'desired rating' below which they do not want to fall.
- The rating constraint is driven by three factors
  - it is one way of protecting against downside risk in operating income (so do not do both)
  - a drop in ratings might affect operating income
  - there is an ego factor associated with high ratings
- Caveat: Every rating constraint has a cost.
  - The cost of a rating constraint is the difference between the unconstrained value and the value of the firm with the constraint.
  - Managers need to be made aware of the costs of the constraints they impose.

Rating constraints are one way of buffering your analysis against the assumption that operating income will not change as leverage changes. If the operating income will suffer when ratings fall below a certain point (say BBB or investment grade), it makes sense to build in that constraint into the analysis.

When managers brag about their high ratings, the questions that should come up are whether the high rating is paying off in terms of higher operating income, and if not, how much stockholders are paying for managers' bragging rights.

Ratings Constraints for Disney

- At its optimal debt ratio of 40%, Disney has an estimated rating of A.
- If managers insisted on a AA rating, the optimal debt ratio for Disney is then 30% and the cost of the ratings constraint is fairly small:

  Cost of AA Rating Constraint = Value at 40% Debt – Value at 30% Debt = $153,531 m – $147,835 m = $ 5,696 million
- If managers insisted on a AAA rating, the optimal debt ratio would drop to 20% and the cost of the ratings constraint would rise:

  Cost of AAA rating constraint = Value at 40% Debt – Value at 20% Debt = $153,531 m – $141,406 m = $ 12,125 million

This may be overstated, since it is based upon the assumption that operating income is unaffected by the change in ratings. To the degree that Disney's operating income will drop if its rating drops below BBB, this will overstate the cost of the constraint.

This process can be modified to allow for other constraints. For instance, some firms do not want their book value debt ratios to rise above a certain level (say, industry averages). In other cases, existing bond covenants may restrict a financial ratio from exceeding a specified number.

3. What if you do not buy back stock..

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

The analysis is built on the assumption that debt is used to buy back stock. Many firms would rather use the debt to take projects, or might be barred from buying back stock (as is the case in markets like Germany)

If we assume that projects in the same line of business have the same cash flow generating capacity as the current firm (EBITDA/Firm Value), the optimal debt ratio will remain unchanged, but the optimal dollar debt will be a much higher number. (This analysis is impervious to changes in scale. If you double all the numbers, the optimal debt ratio will remain unchanged)

If the business you are expanding into has more risk and more negative cashflows, your optimal will decrease.

Extension to a family group company: Tata Motor's Optimal Capital Structure

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	0.8601	12.76%	Aaa/AAA	9.22%	32.45%	6.23%	12.76%	1,286,997₹
10%	0.9247	13.22%	Aa2/AA	9.52%	32.45%	6.43%	12.54%	1,333,263₹
20%	1.0054	13.80%	A3/A-	10.12%	32.45%	6.84%	12.41%	1,363,774₹
30%	1.1092	14.55%	B2/B	15.32%	32.45%	10.35%	13.29%	1,185,172₹
40%	1.2475	15.54%	Caa/CCC	17.57%	32.45%	11.87%	14.07%	1,061,143₹
50%	1.4412	16.93%	Ca2/CC	18.32%	32.45%	12.38%	14.65%	984,693₹
60%	1.7610	19.23%	Ca2/CC	18.32%	30.18%	12.79%	15.37%	904,764₹
70%	2.3749	23.65%	C2/C	19.32%	24.53%	14.58%	17.30%	741,800₹
80%	3.5624	32.19%	C2/C	19.32%	21.46%	15.17%	18.58%	663,028₹
90%	7.1247	57.81%	C2/C	19.32%	19.08%	15.63%	19.85%	599,379₹

Tata Motors looks like it is over levered (29% actual versus 20% optimal), perhaps because it is drawing on the debt capacity of other companies in the Tata Group.

While Tata Motors looks over levered, it is possible that the company is borrowing money on the basis of the Tata Group's financial strength…. Thus, to assess whether there is too much or too little debt, we should be looking at the overall group's optimal and actual debt ratio.

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%

Replacing Vale's current operating income with the average over the last three years pushes up the optimal to 50%.

Vale looks over levered at its current operating income, but since it is a mining company and its normalized income is higher, I think it is less worrisome.

Optimal Debt Ratio for a young, growth firm: Baidu

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	1.3021	12.54%	Aaa/AAA	4.70%	25.00%	3.53%	12.54%	$337,694
10%	1.4106	13.29%	A3/A-	5.60%	25.00%	4.20%	12.38%	$343,623
20%	1.5463	14.23%	Ca2/CC	13.80%	25.00%	10.35%	13.45%	$306,548
30%	1.7632	15.74%	Caa/CCC	14.80%	17.38%	12.23%	14.68%	$272,853
40%	2.0675	17.85%	D2/D	16.30%	11.83%	14.37%	16.46%	$235,510
50%	2.4810	20.72%	D2/D	16.30%	9.47%	14.76%	17.74%	$214,337
60%	3.1012	25.02%	D2/D	16.30%	7.89%	15.01%	19.02%	$196,657
70%	4.1350	32.20%	D2/D	16.30%	6.76%	15.20%	20.30%	$181,672
80%	6.2024	46.54%	D2/D	16.30%	5.92%	15.34%	21.58%	$168,808
90%	12.4049	89.59%	D2/D	16.30%	5.26%	15.44%	22.86%	$157,646

The optimal debt ratio for Baidu is between 0 and 10%, close to its current debt ratio of 5.23%, and much lower than the optimal debt ratios computed for Disney, Vale and Tata Motors.

May be a high flyer in terms of market cap, but cannot afford much debt, since its operating income is low, relative to its market value.

Extension to a private business
Optimal Debt Ratio for Bookscape

Debt value of leases = $12,136 million (only debt)
Estimated market value of equity = Net Income * Average PE for Publicly Traded Book Retailers = 1.575 * 20 = $31.5 million
Debt ratio = 12,136/(12,136+31,500) = 27.81%

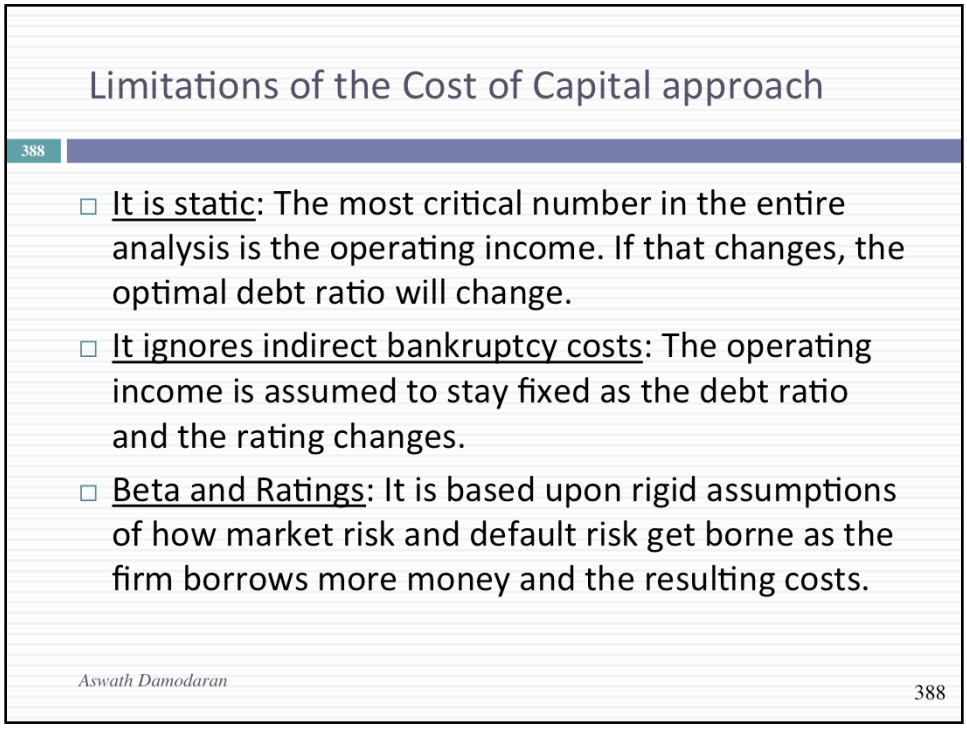
Debt Ratio	Total Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	1.3632	10.25%	Aaa/AAA	3.15%	40.00%	1.89%	10.25%	$37,387
10%	1.4540	10.75%	Aaa/AAA	3.15%	40.00%	1.89%	9.86%	$39,416
20%	1.5676	11.37%	A1/A+	3.60%	40.00%	2.16%	9.53%	$41,345
30%	1.7137	12.18%	A3/A-	4.05%	40.00%	2.43%	9.25%	$43,112
40%	1.9084	13.25%	Caa/CCC	11.50%	40.00%	6.90%	10.71%	$35,224
50%	2.2089	14.90%	Ca2/CC	12.25%	37.96%	7.60%	11.25%	$32,979
60%	2.8099	18.20%	C2/C	13.25%	29.25%	9.37%	12.91%	$27,598
70%	3.7466	23.36%	C2/C	13.25%	25.07%	9.93%	13.96%	$25,012
80%	5.6198	33.66%	C2/C	13.25%	21.93%	10.34%	15.01%	$22,869
90%	11.4829	65.91%	D2/D	14.75%	17.51%	12.17%	17.54%	$18,952

The firm value is maximized (and the cost of capital is minimized) at a debt ratio of 30%. At its existing debt ratio of 27.81%, Bookscape is at its optimal.

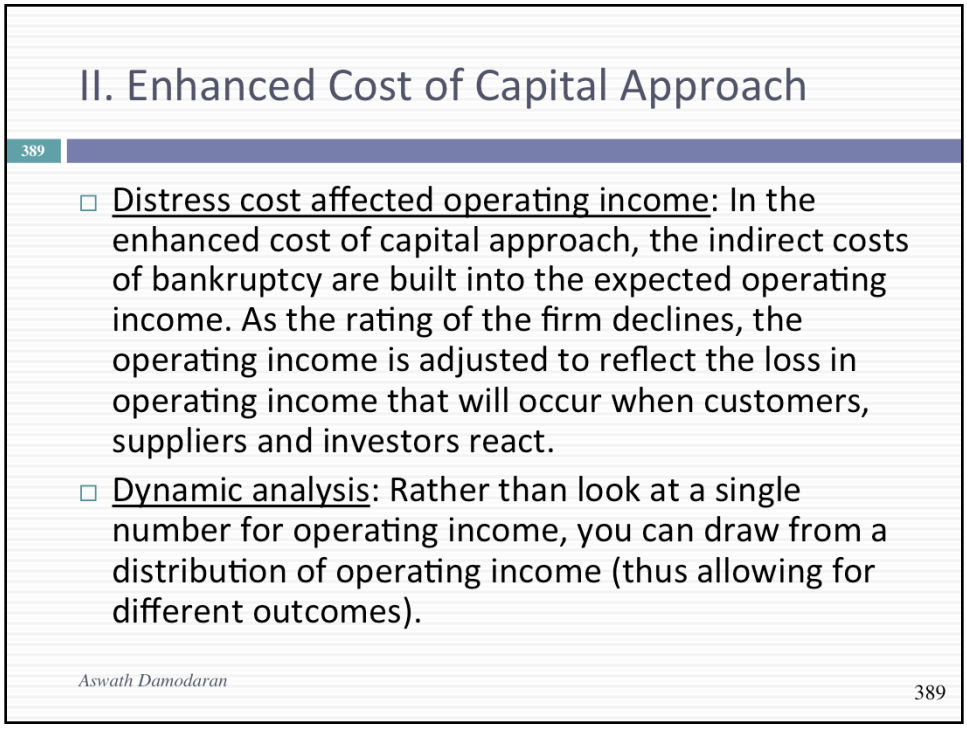
The optimal debt ratio for the private firm is 30%. The firm value is maximized at that point.

To the extent that private business owners view default risk more seriously than stockholders in a publicly traded firm, they will probably be more cautious about moving to the optimal.

We can extend the argument to closely held publicly traded firms. We would expect these firms to have lower debt ratios than publicly traded firms with diverse stockholdings.



While the traditional cost of capital approach is a powerful tool, it has its limitations. In particular, the fact that it leaves the operating income fixed as ratings and debt ratios change implies that we are ignoring indirect bankruptcy costs and thus over estimating optimal debt ratios.



The most significant innovation is that the operating income is a function of the ratings. As he firm borrows more and its rating drops, its operating income will drop to reflect the indirect bankruptcy costs.

Estimating the Distress Effect- Disney

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Rating	*Drop in EBITDA (Low)*	*Drop in EBITDA (Medium)*	*Drop in EBITDA (High)*
To A	No effect	No effect	2.00%
To A-	No effect	2.00%	5.00%
To BBB	5.00%	10.00%	15.00%
To BB+	10.00%	20.00%	25.00%
To B-	15.00%	25.00%	30.00%
To C	25.00%	40.00%	50.00%
To D	30.00%	50.00%	100.00%

To estimate these values, we looked at firms that had been downgraded and looked the change in operating income in the next year. There is a lot of estimation noise in these values…. And a lot of variation across firms.

The Optimal Debt Ratio with Indirect Bankruptcy Costs

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Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	0.9239	8.07%	Aaa/AAA	3.15%	36.10%	2.01%	8.07%	$122,633
10%	0.9895	8.45%	Aaa/AAA	3.15%	36.10%	2.01%	7.81%	$134,020
20%	1.0715	8.92%	Aaa/AAA	3.15%	36.10%	2.01%	7.54%	$147,739
30%	1.1769	9.53%	Aa2/AA	3.45%	36.10%	2.20%	7.33%	$160,625
40%	1.3175	10.34%	A2/A	3.75%	36.10%	2.40%	7.16%	$172,933
50%	1.5573	11.72%	C2/C	11.50%	31.44%	7.88%	9.80%	$35,782
60%	1.9946	14.24%	Caa/CCC	13.25%	22.74%	10.24%	11.84%	$25,219
70%	2.6594	18.07%	Caa/CCC	13.25%	19.49%	10.67%	12.89%	$21,886
80%	3.9892	25.73%	Caa/CCC	13.25%	17.05%	10.99%	13.94%	$19,331
90%	7.9783	48.72%	Caa/CCC	13.25%	15.16%	11.24%	14.99%	$17,311

The optimal debt ratio stays at 40% but the cliff becomes much steeper.

Aswath Damodaran

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When both operating income and cost of capital change, the optimal debt ratio may no longer be at the point where cost of capital is minimized. Firm value may be maximized at a different point, with higher operating income and a a higher cost of capital.

Extending this approach to analyzing Financial Service Firms

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- Interest coverage ratio spreads, which are critical in determining the bond ratings, have to be estimated separately for financial service firms; applying manufacturing company spreads will result in absurdly low ratings for even the safest banks and very low optimal debt ratios.
- It is difficult to estimate the debt on a financial service company's balance sheet. Given the mix of deposits, repurchase agreements, short-term financing, and other liabilities that may appear on a financial service firm's balance sheet, one solution is to focus only on long-term debt, defined tightly, and to use interest coverage ratios defined using only long-term interest expenses.
- Financial service firms are regulated and have to meet capital ratios that are defined in terms of book value. If, in the process of moving to an optimal market value debt ratio, these firms violate the book capital ratios, they could put themselves in jeopardy.

Financial service firms often do not consider debt to be a source of capital, as much as they consider it to be raw material that they use to produce their products.

Thus, most banks borrow, using the regulatory capital ratios as constraints, rather than to minimize cost of capital.

Capital Structure for a bank: A Regulatory Capital Approach

- Consider a bank with $ 100 million in loans made and a book value of equity of $ 6 million. Furthermore, assume that the regulatory requirement is that equity capital be maintained at 5% of loans made. Finally, assume that this bank wants to increase its loan base by $ 50 million to $ 150 million and to augment its equity capital ratio to 7% of loans outstanding.

Loans made after Expansion		= $ 150 million
Equity after expansion	= 7% of $150	= $10.5 million
Existing Equity		= $ 6.0 million
New Equity needed		= $ 4.5 million

- Your need for "external" equity as a bank/financial service company will depend upon
  a. Your growth rate: Higher growth -> More external equity
  b. Existing capitalization vs Target capitalization: Under capitalized -> More external equity
  c. Current earnings: Less earnings -> More external equity
  d. Current dividends: More dividends -> More external equity

Aswath Damodaran

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As regulatory capital ratios increase, banks will have to raise more equity (which adds to regulatory capital) to grow. Conservative banks will raise more equity than aggressive banks.

Assessing the financing mix for a bank or financial service firm boils down to equity. In effect, the firm can have too little or too much book equity, and that judgment is made based upon capital ratios (actual versus required). Unlike non-financial service firms, where debt can be reduced or increased to change the ratio, financial service firms generally have much less flexibility.

So, what can cause book equity to vary across time? Retained earnings obviously. Profits will increase book equity and losses will reduce them. Any dividends paid reduce book equity. For banks, loan losses can reduce book equity dramatically. In other words, a bank can go from being comfortably over funded to significantly under funded overnight.

The one issue in this approach is that it is framed by regulatory defintiions.of equity. Thus, preferred stock is usually counted as equity. After the crisis of 2008, there was a debate about whether wartrants should be counted in book equity.

Deutsche Bank's Financial Mix

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	Current	1	2	3	4	5
Asset Base	439,851 €	453,047 €	466,638 €	480,637 €	495,056 €	509,908 €
Capital ratio	15.13%	15.71%	16.28%	16.85%	17.43%	18.00%
Tier 1 Capital	66,561 €	71,156 €	75,967 €	81,002 €	86,271 €	91,783 €
Change in regulatory capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €
Book Equity	76,829 €	81,424 €	86,235 €	91,270 €	96,539 €	102,051 €
ROE	-1.08%	0.74%	2.55%	4.37%	6.18%	8.00%
Net Income	-716 €	602 €	2,203 €	3,988 €	5,971 €	8,164 €
- Investment in Regulatory Capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €
FCFE		-3,993 €	-2,608 €	-1,047 €	702 €	2,652 €

The cumulative FCFE over the next 5 years is -4,294 million Euros. Clearly, it does not make the sense to pay dividends or buy back stock.

Aswath Damodaran

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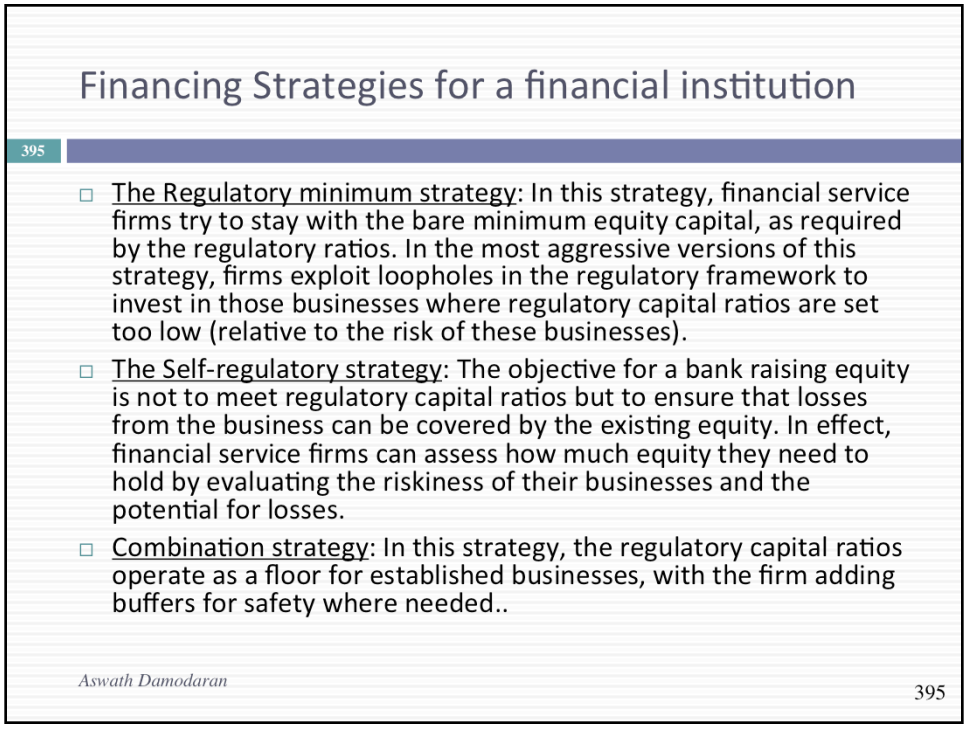

The regulatory minimum strategy is likely to yield the highest profits and ROE during good times but is most likely to expose the firm to problems in bad times. To the extent that governments bail firms out when trouble strikes, firms are going to move towards this strategy because they do not see a downside.

The self regulatory strategy is the only option for firms that have no regulatory overlay or downside protection from an external entity but want to ensure their own survival. For hundreds of years, banks self regulated with mixed results. This is a more resource intensive approach, since you have to examine the risk in your business carefully and make your assessments of possible downside risk.

Combination strategy: In this strategy, you start with regulatory minimum but add to it, based upon how much risk you want to run of facing downside risk. Thus, conservative banks will keep higher capital ratios than required, which will lead to lower ROE.

Determinants of the Optimal Debt Ratio: 1. The marginal tax rate

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

Tax Rate	Disney	Vale	Tata Motors	Baidu	Bookscape
0%	0%	0%	0%	0%	0%
10%	20%	0%	0%	0%	10%
20%	40%	0%	10%	10%	30%
30%	40%	30%	20%	10%	30%
40%	40%	40%	20%	10%	30%
50%	40%	40%	20%	10%	30%

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Note that with zero taxes, the optimal debt ratio goes to zero. Intuitively, if the costs of borrowing (higher bankruptcy cost, agency costs) and the primary benefit disappears, there will always by a net cost to borrowing.

If debt is cheaper than equity on a pre-tax basis (and it generally is), why do we not gain by borrowing?

Because the additional debt makes both debt and equity more expensive. (Ratings drop and betas increase…)

2. Pre-tax Cash flow Return

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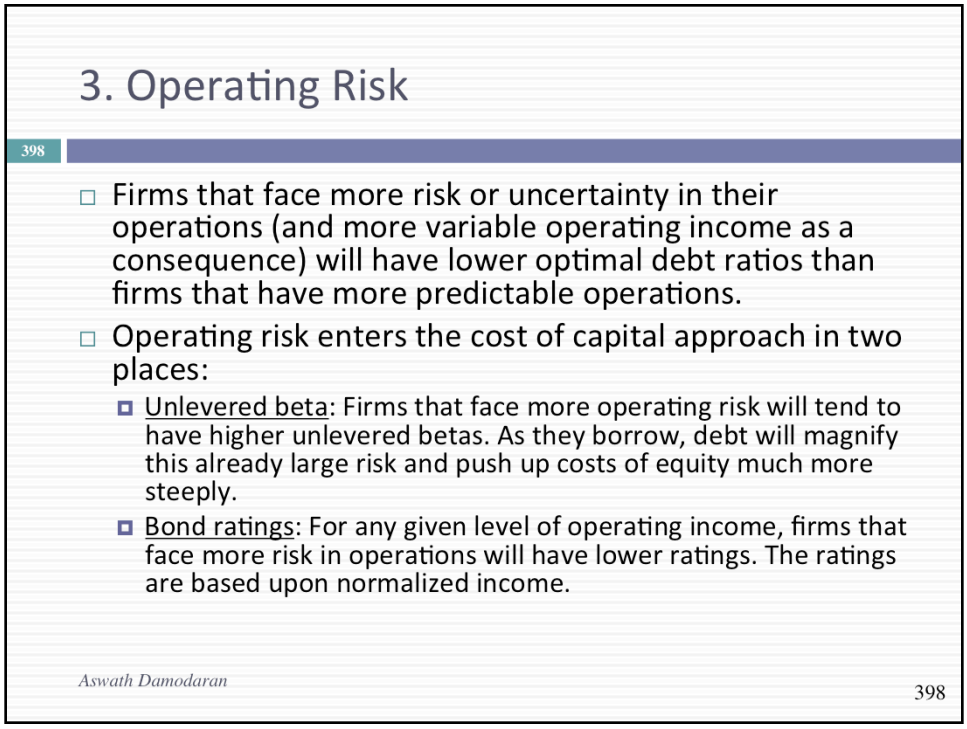
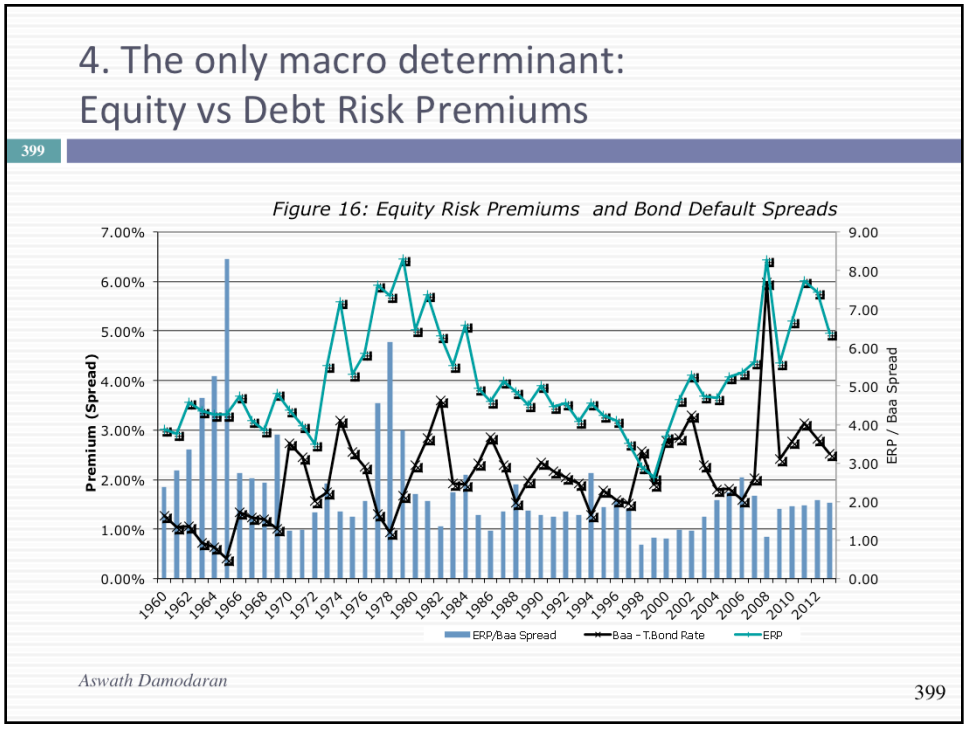
Company	EBITDA	EBIT	Enterprise Value	EBITDA/EV	EBIT/EV	Optimal Debt	Optimal Debt Ratio
Disney	$12,517	$10,032	$133,908	9.35%	7.49%	$55,136	40.00%
Vale	$20,167	$15,667	$112,352	17.95%	13.94%	$35,845	30.00%
Tata Motors	250,116₹	166,605₹	1,427,478₹	17.52%	11.67%	325,986₹	20.00%
Baidu	¥13,073	¥10,887	¥342,269	3.82%	3.18%	¥35,280	10.00%
Bookscape	$4,150	$2,536	$42,636	9.73%	5.95%	$13,091	30.00%

Higher cash flows, as a percent of value, give you a higher debt capacity, though less so in emerging markets with substantial country risk.

This is the answer to the puzzle of why growth firms, even extremely profitable ones like Facebook and Google, tend to have low optimal debt ratios. While they may generate huge dollar profits, their market values are



A risky firm can be very profitable in a good year. However, it should be cautious about borrowing on the basis of that income, since earnings can drop quickly.



The cost of equity is determined by the equity risk premium and the cost of debt by the default spread. When ERP rise (fall) relative to default spreads, firms will borrow more (less).

This graph has the implied equity risk premium and the default spread on a Baa rated bond going back to 1960. While they generally move together, there have been periods of disconnect between the two.

In the late 1990s, equity risk premiums dropped relative to default spreads: Firms should have shifted to equity from debt and optimal debt ratios should have decreased.

Between 2004 and 2007, default spreads dropped while equity risk premiums remained unchanged. It was a golden age for leveraged transactions.

In 2008, risk premia climbed across the board but default spreads increased at a far faster pace than equity risk premium. On a relative basis, debt became more expensive relative to equity.

We would expect optimal debt ratios to decrease across the board as a consequence. . (Between 2004 and 2007, default spreads fell while equity risk premiums stagnated… ushering in the age of leveraged recaps and buyouts)

Since 2008, both equity risk premiums and default spread have dropped, though the ratio has not changed much.

⌛ Application Test: Your firm's optimal financing mix

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- Using the optimal capital structure spreadsheet provided:
  1. Estimate the optimal debt ratio for your firm
  2. Estimate the new cost of capital at the optimal
  3. Estimate the effect of the change in the cost of capital on firm value
  4. Estimate the effect on the stock price
- In terms of the mechanics, what would you need to do to get to the optimal immediately?

The best way to see how capital structure is determined by fundamentals is to try it for a real firm and see how the optimal changes as you change the inputs.

III. The APV Approach to Optimal Capital Structure

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- In the adjusted present value approach, the value of the firm is written as the sum of the value of the firm without debt (the unlevered firm) and the effect of debt on firm value

  Firm Value = Unlevered Firm Value + (Tax Benefits of Debt - Expected Bankruptcy Cost from the Debt)

- The optimal dollar debt level is the one that maximizes firm value

This is an alternative approach with the same objective of maximizing firm value. It assesses the costs and benefits of debt in dollar value terms rather than through the cost of capital.

Implementing the APV Approach

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- Step 1: Estimate the unlevered firm value. This can be done in one of two ways:
  - Estimating the unlevered beta, a cost of equity based upon the unlevered beta and valuing the firm using this cost of equity (which will also be the cost of capital, with an unlevered firm)
  - Alternatively, Unlevered Firm Value = Current Market Value of Firm - Tax Benefits of Debt (Current) + Expected Bankruptcy cost from Debt
- Step 2: Estimate the tax benefits at different levels of debt. The simplest assumption to make is that the savings are perpetual, in which case
  - Tax benefits = Dollar Debt * Tax Rate
- Step 3: Estimate a probability of bankruptcy at each debt level, and multiply by the cost of bankruptcy (including both direct and indirect costs) to estimate the expected bankruptcy cost.

In practice, analysts often do the first two steps but skip the third because the inputs are so difficult to get. The result is that the value of the firm always go up as you borrow money, since you count in the tax benefits but you don't consider the bankrutpcy costs.

Estimating Expected Bankruptcy Cost

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- Probability of Bankruptcy
  - Estimate the synthetic rating that the firm will have at each level of debt
  - Estimate the probability that the firm will go bankrupt over time, at that level of debt (Use studies that have estimated the empirical probabilities of this occurring over time - Altman does an update every year)
- Cost of Bankruptcy
  - The direct bankruptcy cost is the easier component. It is generally between 5-10% of firm value, based upon empirical studies
  - The indirect bankruptcy cost is much tougher. It should be higher for sectors where operating income is affected significantly by default risk (like airlines) and lower for sectors where it is not (like groceries)

The two key inputs you need to estimate the expected bankruptcy cost. The first one is easier to get than the second. There have been attempts to measure the magnitude of indirect bankruptcy costs and they conclude that

1. Indirect bankruptcy costs can be as high as 20-30% of firm value
2. Indirect bankrtupcy costs as a percent of firm value are different for different firms. In general, they tend to be higher for firms that produce longer life assets than for assets that have shorter lives and for firms where reputation matters more.

Ratings and Default Probabilities: Results from Altman study of bonds

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Rating	Likelihood of Default
AAA	0.07%
AA	0.51%
A+	0.60%
A	0.66%
A-	2.50%
BBB	7.54%
BB	16.63%
B+	25.00%
B	36.80%
B-	45.00%
CCC	59.01%
CC	70.00%
C	85.00%
D	100.00%

Altman estimated these probabilities by looking at bonds in each ratings class ten years prior and then examining the proportion of these bonds that defaulted over the ten years.

This table is updated every year by Ed Altman at the Stern School of Business. It is the probability that a bond is each of these ratings classes will default and is based upon actual default rates over 10 years of bonds in each ratings class. This is from the 2009 update.

Disney: Estimating Unlevered Firm Value

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Current Value of firm = $121,878+ $15,961	= $ 137,839
- Tax Benefit on Current Debt = $15,961 * 0.361	= $ 5,762
+ Expected Bankruptcy Cost = 0.66% * (0.25 * 137,839) =	$ 227
Unlevered Value of Firm =	= $ 132,304

- Cost of Bankruptcy for Disney = 25% of firm value
- Probability of Bankruptcy = 0.66%, based on firm's current rating of A
- Tax Rate = 36.1%

To implement APV, you have to first estimate the unlevered firm value.We are using a short-cut to derive the tax benefit from current debt and the indirect bankruptcy cost is an assumption (we went right for the mid-point of the 10-40% range for all companies.

Disney: APV at Debt Ratios

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Debt Ratio	$ Debt	Tax Rate	Unlevered Firm Value	Tax Benefits	Bond Rating	Probability of Default	Expected Bankruptcy Cost	Value of Levered Firm
0%	$0	36.10%	$132,304	$0	AAA	0.07%	$23	$132,281
10%	$13,784	36.10%	$132,304	$4,976	Aaa/AAA	0.07%	$24	$137,256
20%	$27,568	36.10%	$132,304	$9,952	Aaa/AAA	0.07%	$25	$142,231
30%	$41,352	36.10%	$132,304	$14,928	Aa2/AA	0.51%	$188	$147,045
40%	$55,136	36.10%	$132,304	$19,904	A2/A	0.66%	$251	$151,957
50%	$68,919	36.10%	$132,304	$24,880	B3/B-	45.00%	$17,683	$139,501
60%	$82,703	36.10%	$132,304	$29,856	C2/C	59.01%	$23,923	$138,238
70%	$96,487	32.64%	$132,304	$31,491	C2/C	59.01%	$24,164	$139,631
80%	$110,271	26.81%	$132,304	$29,563	Ca2/CC	70.00%	$28,327	$133,540
90%	$124,055	22.03%	$132,304	$27,332	Caa/CCC	85.00%	$33,923	$125,713

The optimal debt ratio is 40%, which is the point at which firm value is maximized.

Disney's optimal debt ratio is 40%, which matches the optimal debt ratio from the cost of capital approach.

IV. Relative Analysis

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

Most firms pick their debt ratios by looking at industry averages. By staying close to the average, managers get cover in case they make mistakes - everyone else has made the same mistake.

Managers also try to stay close to the industry average, because ratings agencies and equity research analysts look at these averages.

Comparing to industry averages

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	Debt to Capital Ratio		Net Debt to Capital Ratio			Debt to Capital Ratio		Net Debt to Capital Ratio	
Company	*Book value*	*Market value*	*Book value*	*Market value*	*Comparable group*	*Book value*	*Market value*	*Book value*	*Market value*
Disney	22.88%	11.58%	17.70%	8.98%	US Entertainment	39.03%	15.44%	24.92%	9.93%
Vale	39.02%	35.48%	34.90%	31.38%	Global Diversified Mining & Iron Ore (Market cap> $1 b)	34.43%	26.03%	26.01%	17.90%
Tata Motors	58.51%	29.28%	22.44%	19.25%	Global Autos (Market Cap> $1 b)	35.96%	18.72%	3.53%	0.17%
Baidu	32.93%	5.23%	20.12%	2.32%	Global Online Advertising	6.37%	1.83%	-27.13%	-2.76%

Based on this comparison, Disney is operating at a debt ratio lower than those of other firms in the industry in both market and book value terms, whereas Vale and Tata Motors have debt ratios much higher than the averages for their sector.

The underlying assumptions in this comparison are that firms within the same industry are **comparable** and that, on average, these firms are operating at or close to their optimal. Both assumptions can be questioned, however. Firms within the same industry can have different product mixes, different amounts of operating risk, different tax rates, and different project returns. In fact, most do. For instance, Disney is considered part of the entertainment industry, but its mix of businesses is very different from that of Lion's Gate, which is primarily a movie company, or Liberty Media, which is primarily a cable broadcasting company. Furthermore, Disney's size and risk characteristics are very different from that of Westwood One, which is also considered part of the same industry group. The other problem is that, as we noted in Chapter 4, both Disney and Vale are multi-business companies and picking a sector to compare these firms is difficult to do.

Getting past simple averages

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Step 1: Run a regression of debt ratios on the variables that you believe determine debt ratios in the sector. For example,

Debt Ratio = a + b (Tax rate) + c (Earnings Variability) + d (EBITDA/ Firm Value)

Check this regression for statistical significance (t statistics) and predictive ability (R squared)

Step 2: Estimate the values of the proxies for the firm under consideration. Plugging into the cross sectional regression, we can obtain an estimate of predicted debt ratio.

Step 3: Compare the actual debt ratio to the predicted debt ratio.

This is one way to control for differences across firms. The variables in the regression should be proxies for the factors that drive the debt trade-off

Tax Benefit	->	Tax Rate
Bankruptcy Risk	->	Earnings Variability
Agency Costs	->	EBITDA/Firm Value

Applying the Regression Methodology: Global Auto Firms

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- Using a sample of 56 global auto firms, we arrived at the following regression:

Debt to capital = 0.09 + 0.63 (Effective Tax Rate) + 1.01 (EBITDA/ Enterprise Value) - 0.93 (Cap Ex/ Enterprise Value)

- The R squared of the regression is 21%. This regression can be used to arrive at a predicted value for Tata Motors of:

Predicted Debt Ratio = 0.09 + 0.63 (0.252) +1.01 (0.1167) - 0.93 (0.1949) = .1854 or 18.54%

- Based upon the capital structure of other firms in the automobile industry, Tata Motors should have a market value debt ratio of 18.54%. It is over levered at its existing debt ratio of 29.28%.

This assumes a linear relationship between the independent variables and the debt ratio. The variables can be transformed if the relationship is non-linear.

I plugged in the values for Tata Motors into the regression. This suggest that TMT is underlevered, relative to comparable firms, after controlling for differences across these firms. Note that the low R-squared will also result in large prediction errors.

Extending to the entire market

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- Using 2014 data for US listed firms, we looked at the determinants of the market debt to capital ratio. The regression provides the following results –

DFR = 0.27 - 0.24 ETR -0.10 g– 0.065 INST -0.338 CVOI+ 0.59 E/V

(15.79) (9.00) (2.71) (3.55) (3.10) (6.85)

DFR = Debt / (Debt + Market Value of Equity)

ETR = Effective tax rate in most recent twelve months

INST = % of Shares held by institutions

CVOI = Std dev in OI in last 10 years/ Average OI in last 10 years

E/V = EBITDA/ (Market Value of Equity + Debt- Cash)

The regression has an **R-squared of 8%.**

This looks at the entire market and uses the following variables (from Value Line CD-ROM)

Tax Rate *as proxy for*	tax benefits	
Effective tax rate	for	Tax benefits of debt
INST	for	Disciplinary power of debt (more institutions – Less need?)
CVOI	for	Bankruptcy costs
EBITDA/Value	for	Cash flow generating capacity

Low R-squared is typical of these large cross sectional regressions.

Applying the Regression

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- Disney had the following values for these inputs in 2008. Estimate the optimal debt ratio using the debt regression.

  ETR = 31.02%

  Expected Revenue Growth = 6.45%

  INST = 70.2%

  CVOI = 0.0296

  E/V = 9.35%

Optimal Debt Ratio

= 0.27 - 0.24 (.3102) -0.10 (.0645)– 0.065 (.702) -0.338 (.0296)+ 0.59 (.0935)

= 0.1886 or 18.86%

- What does this optimal debt ratio tell you?

- Why might it be different from the optimal calculated using the weighted average cost of capital?

Based upon the debt ratios of other firms in the market and Disney's financial characteristics, we would expect Disney to have a debt ratio of 19%. Since its actual debt ratio is 12%, Disney is under levered.

It may be different from the optimal because it is based upon the assumption that firms, on average, get their debt ratios right. If most firms are under levered, for instance, you will get a lower predicted value from the regression than for a cost of capital approach.

Summarizing the optimal debt ratios…

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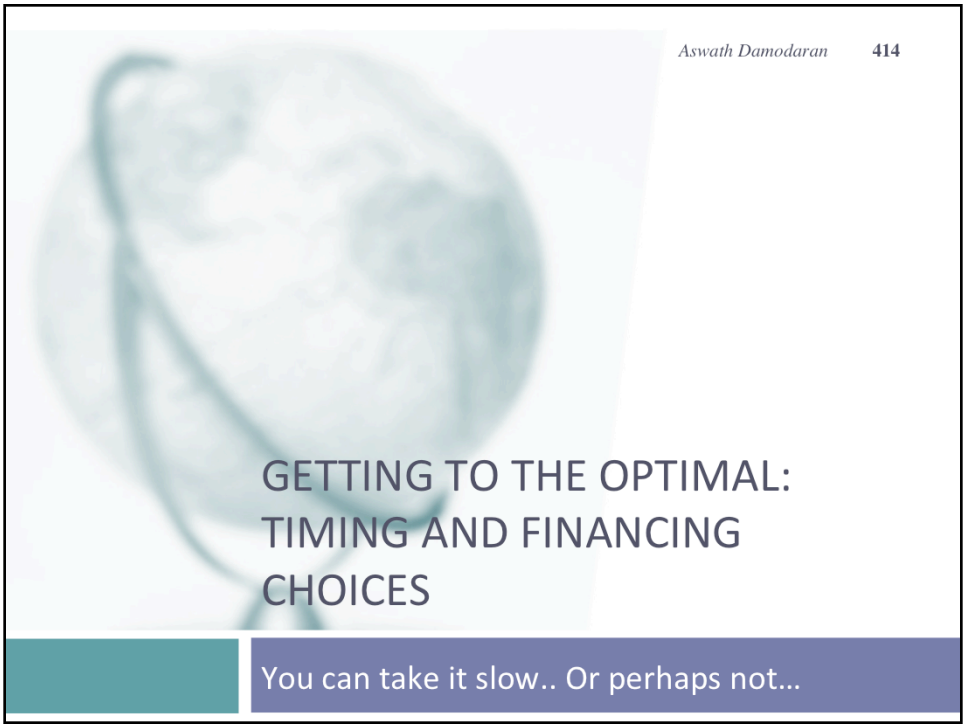
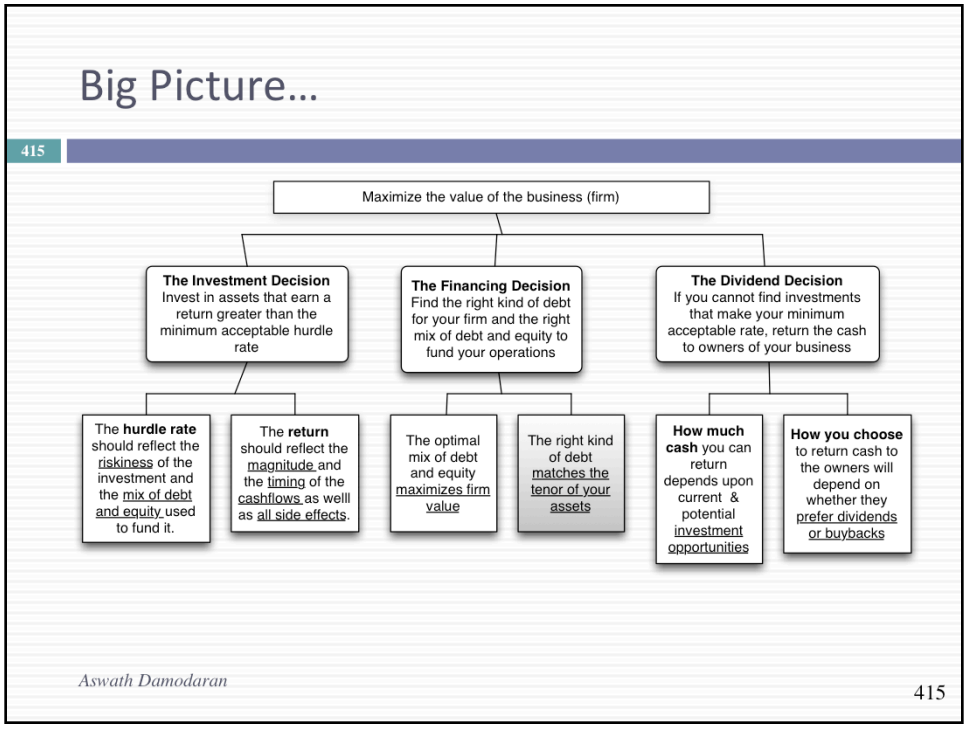
	Disney	*Vale*	*Tata Motors*	*Baidu*
Actual Debt Ratio	11.58%	*35.48%*	*29.28%*	*5.23%*
Optimal				
I. Operating income	35.00%	—	-	
II. Standard Cost of capital	40.00%	30.00% (actual) 50.00% (normalized)	20.00%	10.00%
III. Enhanced Cost of Capital	40.00%	30.00% (actual) 40.00% (normalized)	10.00%	10.00%
IV. APV	40.00%	30.00%	20.00%	20.00%
V. Comparable				
To industry	28.54%	26.03%	18.72%	1.83%
To market	18.86%	—	-	

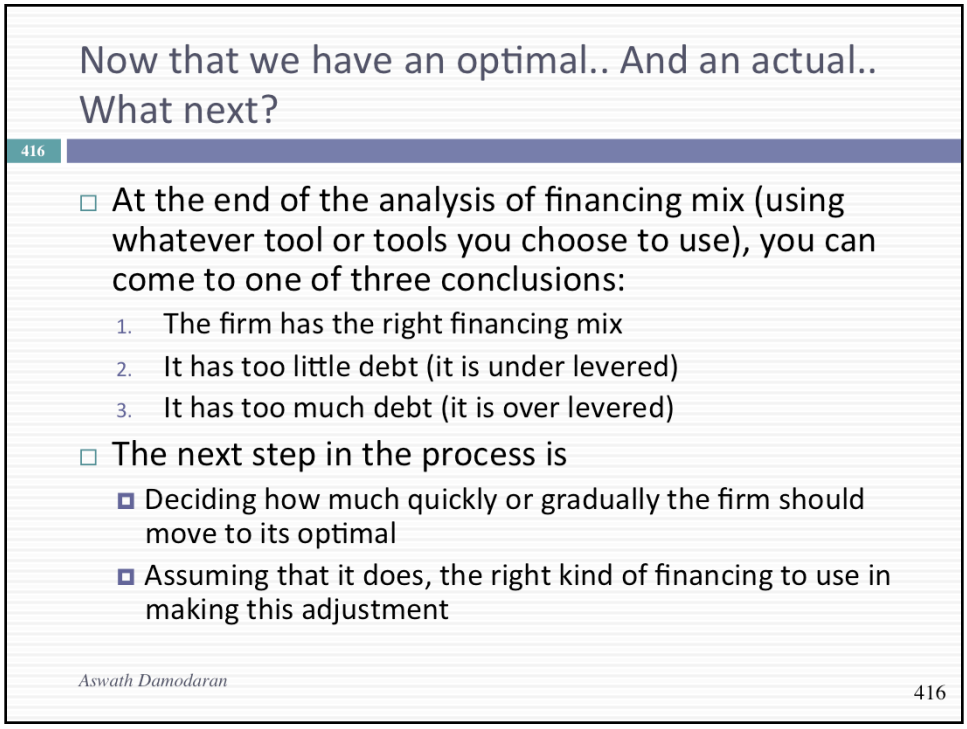
Disney is under levered, no matter how you slice it. Vale is close to fairly levered, if you assume that income will bounce back. Tata Motors is over levered and Baidu is very mildly under levered.



There is no one path to get from the actual to the optimal. It will vary from firm to firm, and even for the same firm, across time.

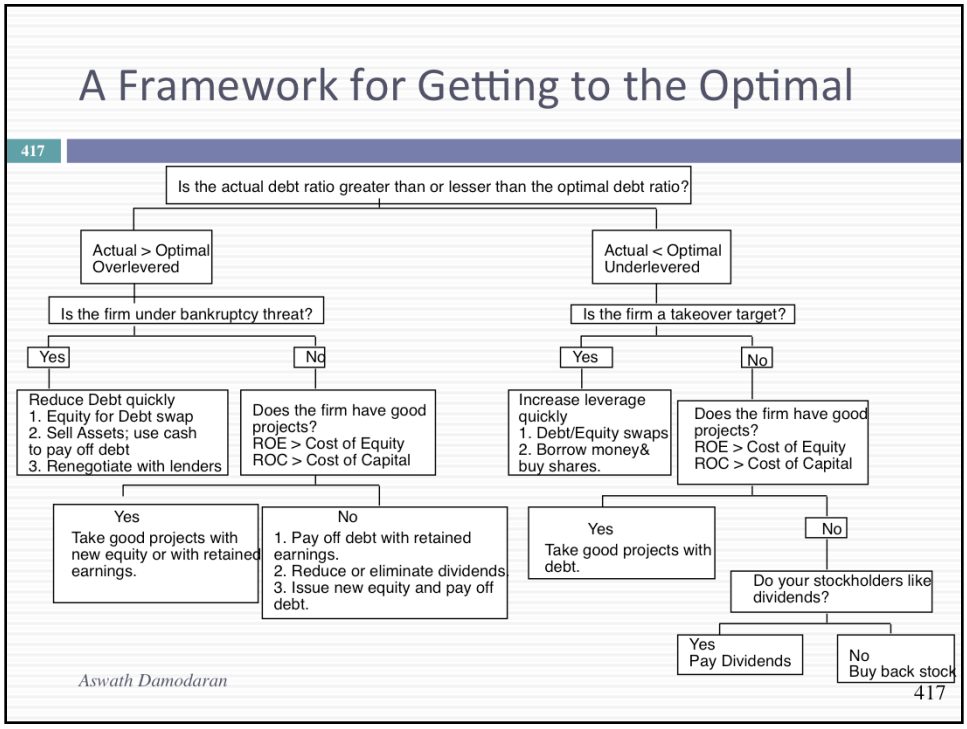


Completes the financing principle part of the analysis…



When a firm is under or over levered, the natural reaction of the analyst looking at the numbers is that the firm should fix the problem instantaneously. However, there is a cost to abrupt shifts in capital structures:

1. You could be wrong in your assessment of the optimal: In other words, you may have misestimated the optimal, in which case the firm may have to back track, if it has followed your recommendations. That is expensive to do (and sometimes fatal).
2. Macro variables may shift: If there is a shift in the macro environment (interest rates and risk premiums could change), your recommendations can be wrong in hindisight
3. Adjustment costs: Changes in capital structure can change the way a company is managed and decision makers may not be ready to make the shift. Managers at highly levered firms have to make decisions differently (and perhaps focus on different decision rules) than managers at lightly levered firms. Increasing the debt ratio for a firm overnight can create adjustment problems for these managers.



Studies that have looked at the likelihood of a firm being taken over (in a hostile takeover) have concluded that

Small firms are more likely to be taken over than larger firms

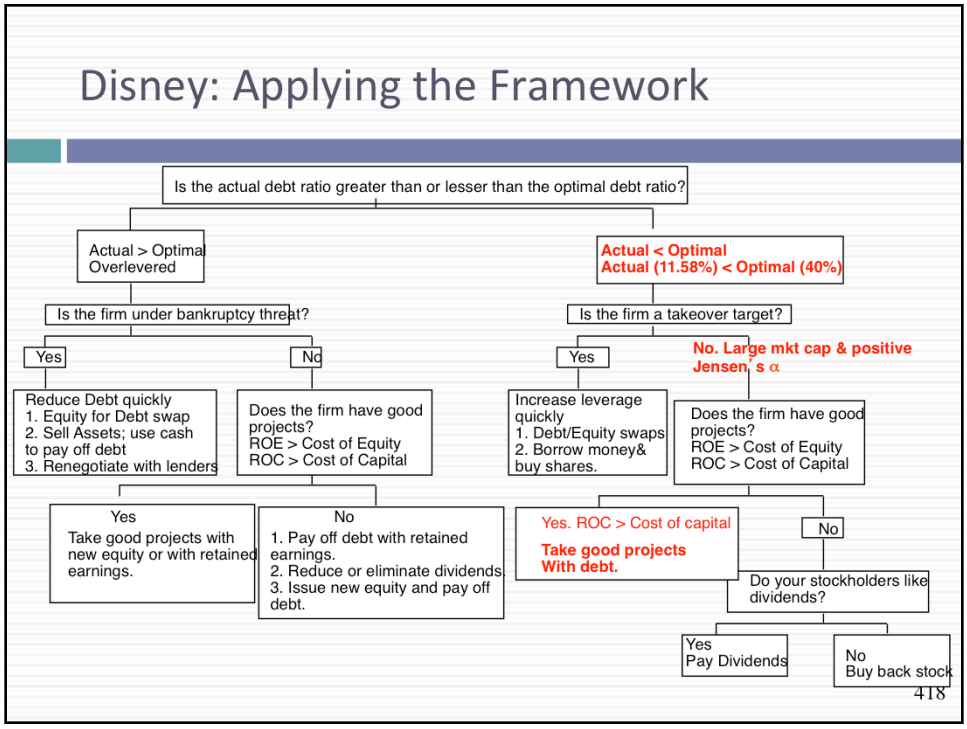
Closely held firms are less likely to be taken over than widely held firms

Firms with anti-takeover restrictions in the corporate charter (or from the state) are less likely to be taken over than firms without these restrictions

Firms which have done well for their stockholders (positive Jensen's alpha, Positive EVA) are less likely to be taken over than firms which have done badly.

Whether a firm is under bankruptcy threat can be assessed by looking at its rating. If its rating is BB or less, you can argue that the bankruptcy threat is real.

Looking at historical ROE or ROC, relative to the cost of equity and capital, does assume that the future will look like the past.



This is the analysis for Disney in 2013.

I am assuming that future projects will be more successful than current projects..

Over time, our assessments have changed:

In 2009, the firm was close to correctly levered and there was little to do

In 2003, we would have pushed for higher dividends (since Disney was earning terrible returns on capital and we did not trust management)

In 2000, Disney would have been a takeover target (because its market cap had dropped and its performance was awful on both accounting and stock price returns)

In 1997, Disney would not have been a takeover target (high market cap, good performance) and its excess debt capacity would have been directed to good investments.

Application Test: Getting to the Optimal

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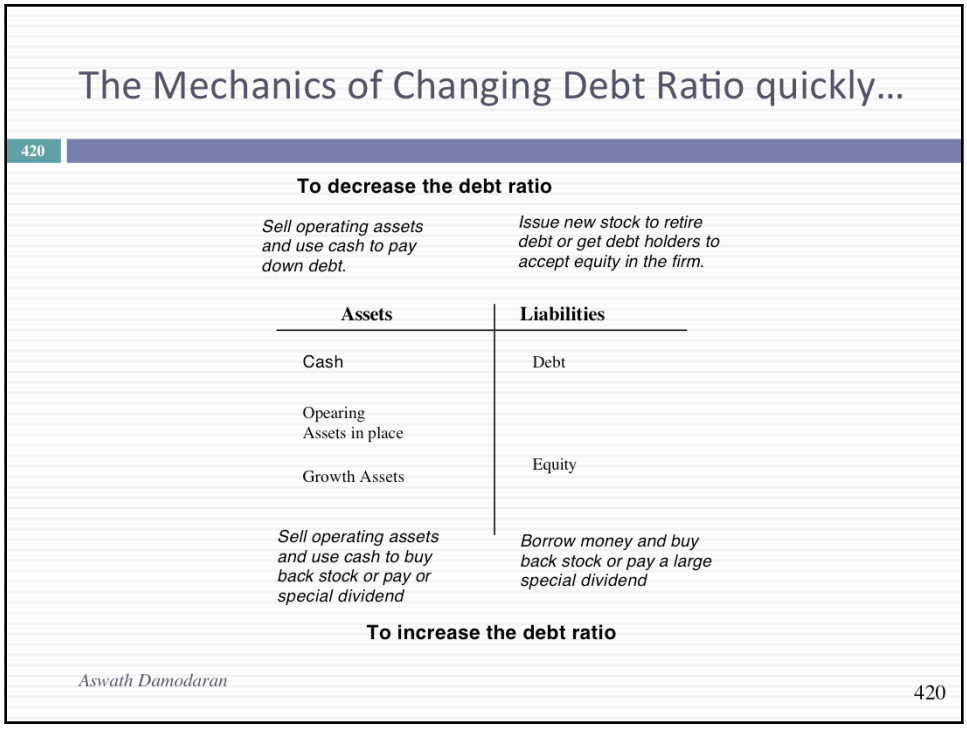
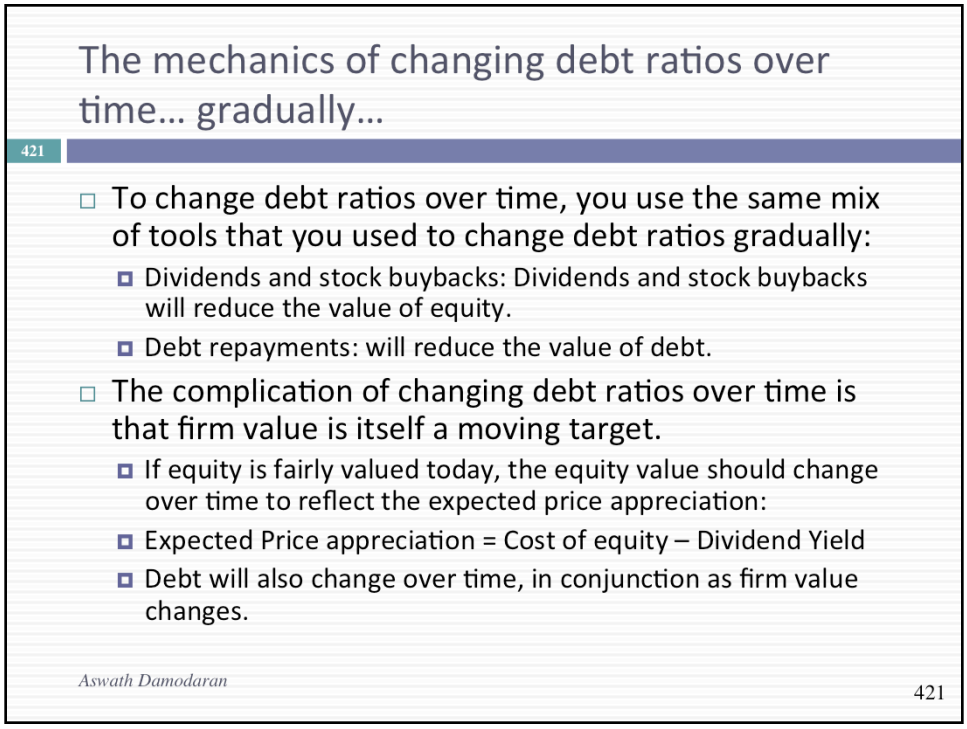
- Based upon your analysis of both the firm's capital structure and investment record, what path would you map out for the firm?
  a. Immediate change in leverage
  b. Gradual change in leverage
  c. No change in leverage
- Would you recommend that the firm change its financing mix by
  a. Paying off debt/Buying back equity
  b. Take projects with equity/debt

Map out your firm's path to the optimal debt ratio depending upon

1. Urgency: If your is a likely target for an acquisition or bankruptcy, go for an immediate change. If not, go for a gradual change.
2. If your stock price performance has been poor (Jensen's alpha < 0) and your project choice has yielded negative excess returns (EVA <0) , go for recapitalization (paying off debt or buying back equity). If you have good projects, go for good investments.



To change the debt ratio, we can use either a pure recapitalization (where the assets remain unchanged but the liability side changes) or a mixed strategy where both sides of the balance sheet change. Which one you adopt will depend upon the market you are in (when capital markets are open and liquid, it is easier to do recapitalizations), the nature of your assets (liquid assets are easier to sell) and the magnitude of the change (bigger changes are more likely to require mixed strategies).



When debt ratios are changed over time, the biggest complication is that the firm value itself will change over time as a function of new investments made and expected growth in both equity and debt values. Put another way, trying to get to 40% of the firm value 5 years from now is more complicated than getting to 40% of firm value today… since firm value 5 years from now will be different from firm value today.

Designing Debt: The Fundamental Principle

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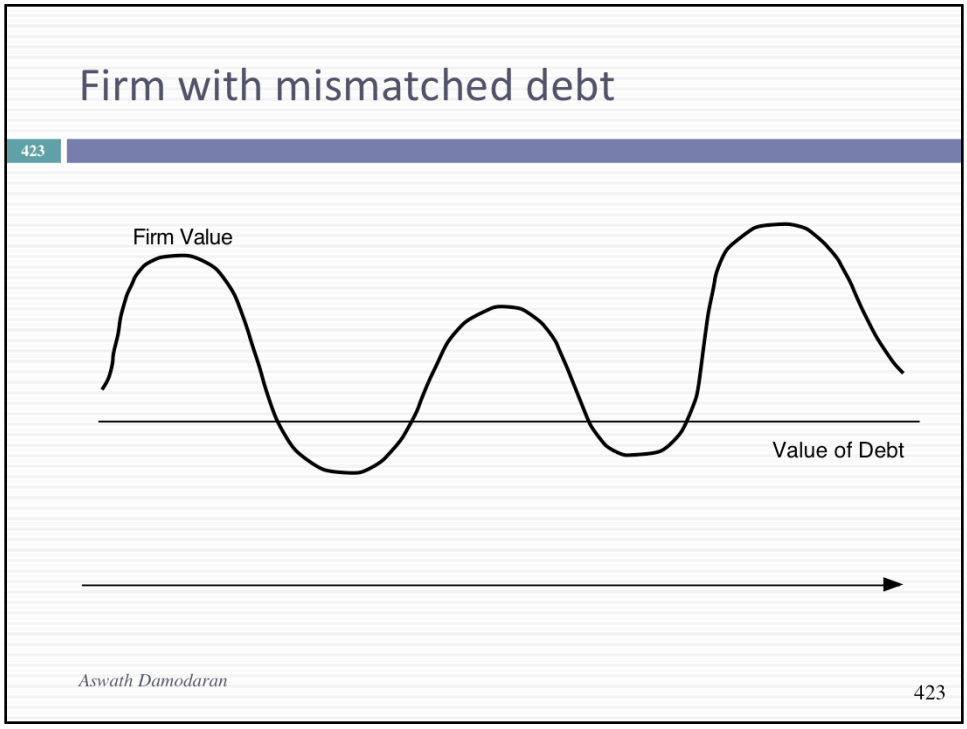
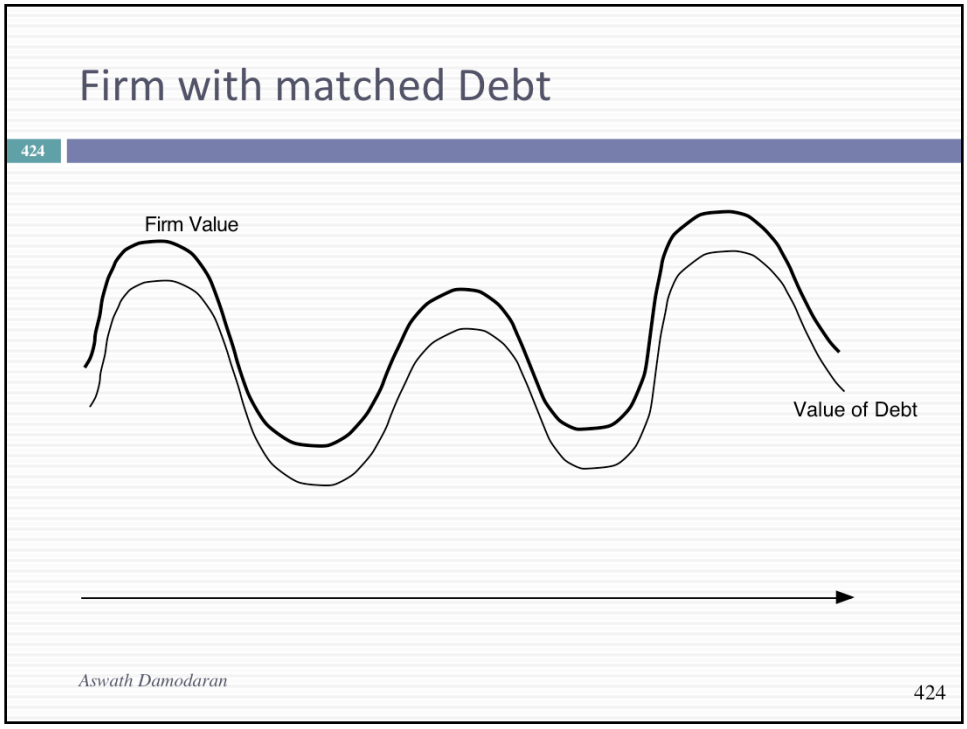
- The objective in designing debt is to make the cash flows on debt match up as closely as possible with the cash flows that the firm makes on its assets.
- By doing so, we reduce our risk of default, increase debt capacity and increase firm value.

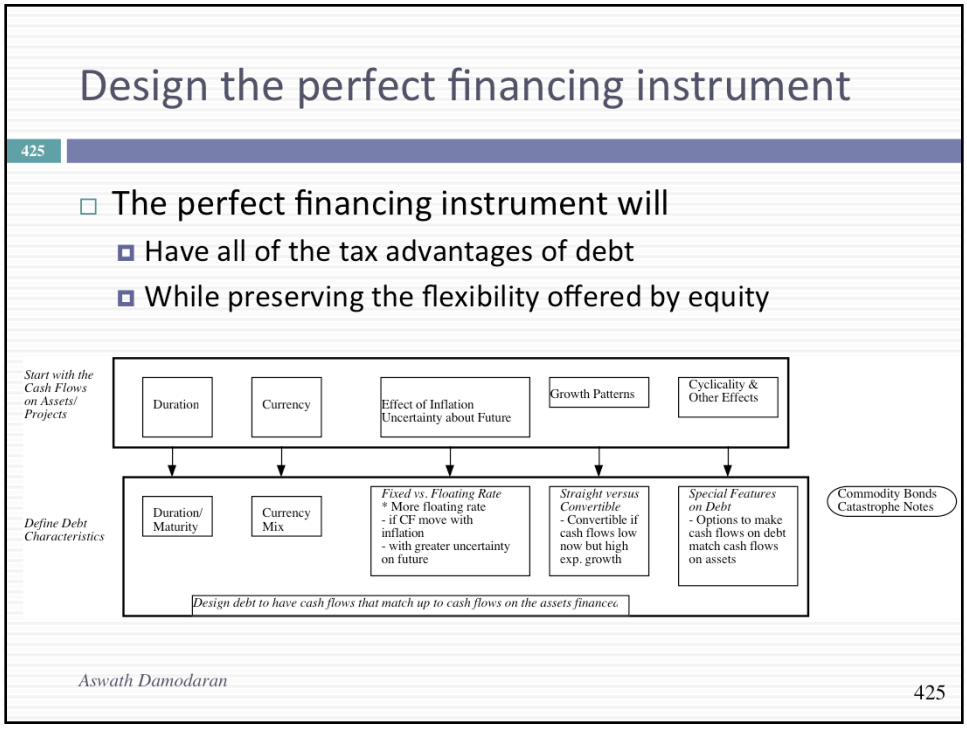
Your objective is issue securities that bring you all of the tax benefits of debt while providing you with the flexibility of equity. It is not the reduction in risk but the increase in debt capacity that generates the value. A firm that does not use this debt capacity will not gain from matching debt to assets in the first place.



Note that the firm goes bankrupt in the two periods, when the firm value falls below the value of the debt.



The same firm never goes bankrupt, even though it has borrowed a lot more.



There is ample scope for creativity in trying to design the perfect bond. The idea is to design debt that looks and acts like equity, in terms of the cash flows.

Consider each aspect;

1. Duration: Companies with long term projects (Boeing) should use long term debt. Companies with short term projects (Dell) should use short term debt.
2. Currency: Companies that get a high proportion of their revenues from non-domestic operations should use more foreign currency debt (especially if the currency mix is stable.
3. Inflation: Companies with pricing power can pass inflation through into their cash flows. These companies should be much better candidates for floating rate debt (because interest expenses on the debt will rise and fall with inflation).
4. Growth pattern: Mature companies with level , steady cash flows should be much better candidates for straight debt, whereas growth companies are much better candidates for convertible debt.

Ensuring that you have not crossed the line drawn by the tax code

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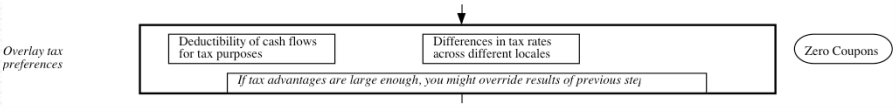
- All of this design work is lost, however, if the security that you have designed does not deliver the tax benefits.
- In addition, there may be a trade off between mismatching debt and getting greater tax benefits.



Note though that all is lost if the tax authorities do not allow you to subtract interest expenses for tax purposes.

It is also possible that you could increase your tax benefits by deviating from your perfect bond and issuing bonds in the wrong currency or the wrong maturity.

While keeping equity research analysts, ratings agencies and regulators applauding

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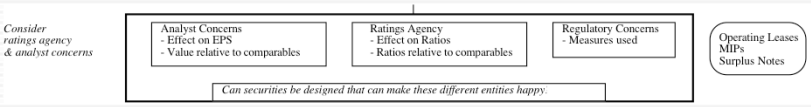
- Ratings agencies want companies to issue equity, since it makes them safer.
- Equity research analysts want them not to issue equity because it dilutes earnings per share.
- Regulatory authorities want to ensure that you meet their requirements in terms of capital ratios (usually book value).
- Financing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



This is a tough balancing act to pull off. You have to issue a security that looks like equity to the ratings agency, debt to the equity research analysts and equity again to your regulatory authorities (if you are a financial service firm).

While it may seem impossible, trust preferred and several other very profitable innovations (at least to investment bankers) have succeeded in doing this.

Debt or Equity: The Strange Case of Trust Preferred

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- Trust preferred stock has
  - A fixed dividend payment, specified at the time of the issue
  - That is tax deductible
  - And failing to make the payment can give these shareholders voting rights
- When trust preferred was first created, ratings agencies treated it as equity. As they have become more savvy, ratings agencies have started giving firms only partial equity credit for trust preferred.

Ratings agencies have learnt over time, but slowly. As they have learnt, investment banks have come up with new securities that have the same objective.

Debt, Equity and Quasi Equity

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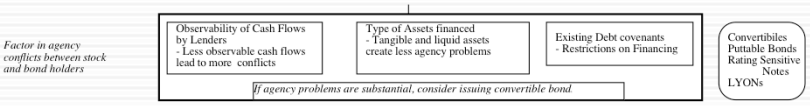
- Assuming that trust preferred stock gets treated as equity by ratings agencies, which of the following firms is the most appropriate firm to be issuing it?
  a. A firm that is under levered, but has a rating constraint that would be violated if it moved to its optimal
  b. A firm that is over levered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

I would expect under levered firms to gain, and over levered firms to lose by doing this. The latter might fool the ratings agencies but they lose because of the expected default cost that they create for themselves.

Soothe bondholder fears

- There are some firms that face skepticism from bondholders when they go out to raise debt, because
  - Of their past history of defaults or other actions
  - They are small firms without any borrowing history
- Bondholders tend to demand much higher interest rates from these firms to reflect these concerns.



While adding these conditions to debt may make it less attractive to the firm, it may be only way they can borrow.

And do not lock in market mistakes that work against you

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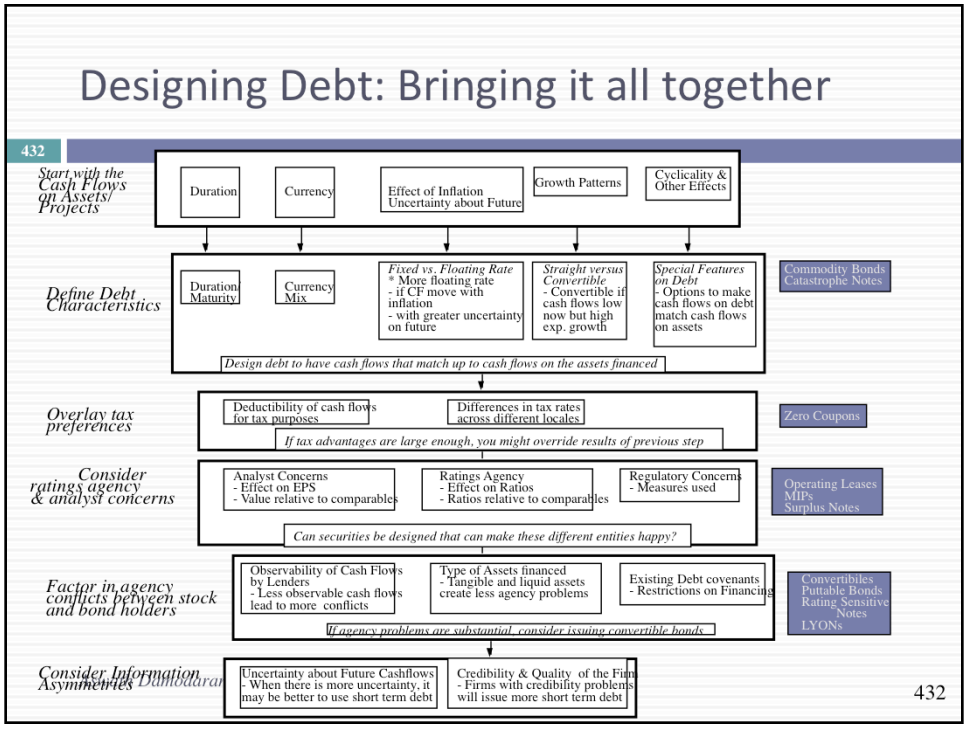
- Ratings agencies can sometimes under rate a firm, and markets can under price a firm's stock or bonds. If this occurs, firms should not lock in these mistakes by issuing securities for the long term. In particular,
  - Issuing equity or equity based products (including convertibles), when equity is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

When you feel that your equity or debt is under valued, you do not want to lock in the under valuation. You should use short-term solutions (bridge financing) until they feel more comfortable with the valuations. Bridge financing includes short term debt and short term warrants.



This provides the basic framework for designing the right kind of debt.

You begin by trying to match up financing type to asset type (in terms of duration, currency, growth patterns and special features). By doing so, you reduce your risk of bankruptcy, increase your capacity to borrow and consequently the tax benefits of debt.

Then, you modify the "perfect debt"

- For tax factors, to ensure that you get the maximum tax benefit
- To meet the needs and objectives of equity research analysts and ratings agencies
- To fix any agency conflicts that might prevent lenders from lending
- To prevent an undeservedly low rating from pushing up the cost of debt above what it should be. (If you are under rated, you should probably use short term debt until you feel your rating is justified)

Approaches for evaluating Asset Cash Flows

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I. Intuitive Approach
- Are the projects typically long term or short term? What is the cash flow pattern on projects?
- How much growth potential does the firm have relative to current projects?
- How cyclical are the cash flows? What specific factors determine the cash flows on projects?

II. Project Cash Flow Approach
- Estimate expected cash flows on a typical project for the firm
- Do scenario analyses on these cash flows, based upon different macro economic scenarios

III. Historical Data
- Operating Cash Flows
- Firm Value

These are the three basic approaches to assessing the cash flow characteristics of your asset base. The last two approaches provide more quantitative answers but may not work for companies which have a short history or have changed their asset mixes over time.

I. Intuitive Approach - Disney

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.

There is plenty of room to be creative in this approach.

Look at firms which operate in each of these businesses and see what financing they use. That might be useful in designing the right kind of debt.

Application Test: Choosing your Financing Type

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- Based upon the business that your firm is in, and the typical investments that it makes, what kind of financing would you expect your firm to use in terms of
  a. Duration (long term or short term)
  b. Currency
  c. Fixed or Floating rate
  d. Straight or Convertible

Based upon what a typical investment looks like, assess the right type of debt for your firm….

II. Project Specific Financing

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- With project specific financing, you match the financing choices to the project being funded. The benefit is that the the debt is truly customized to the project.
- Project specific financing makes the most sense when you have a few large, independent projects to be financed. It becomes both impractical and costly when firms have portfolios of projects with interdependent cashflows.

If you have large, stand alone projects, you can try to match the debt specifically to the project's characteristics. If you take lots of smaller projects, you will often find it less costly to finance a portfolio of projects rather than each project individually.

Duration of Disney Theme Park

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Year	Annual Cashflow	Terminal Value	Present Value @8.46%	Present value *t
0	-$2,000		-$2,000	$0
1	-$1,000		-$922	-$922
2	-$859		-$730	-$1,460
3	-$267		-$210	-$629
4	$340		$246	$983
5	$466		$311	$1,553
6	$516		$317	$1,903
7	$555		$314	$2,200
8	$615		$321	$2,568
9	$681		$328	$2,952
10	$715	$11,275	$5,321	$53,206
			$3,296	$62,355
				18.91893724

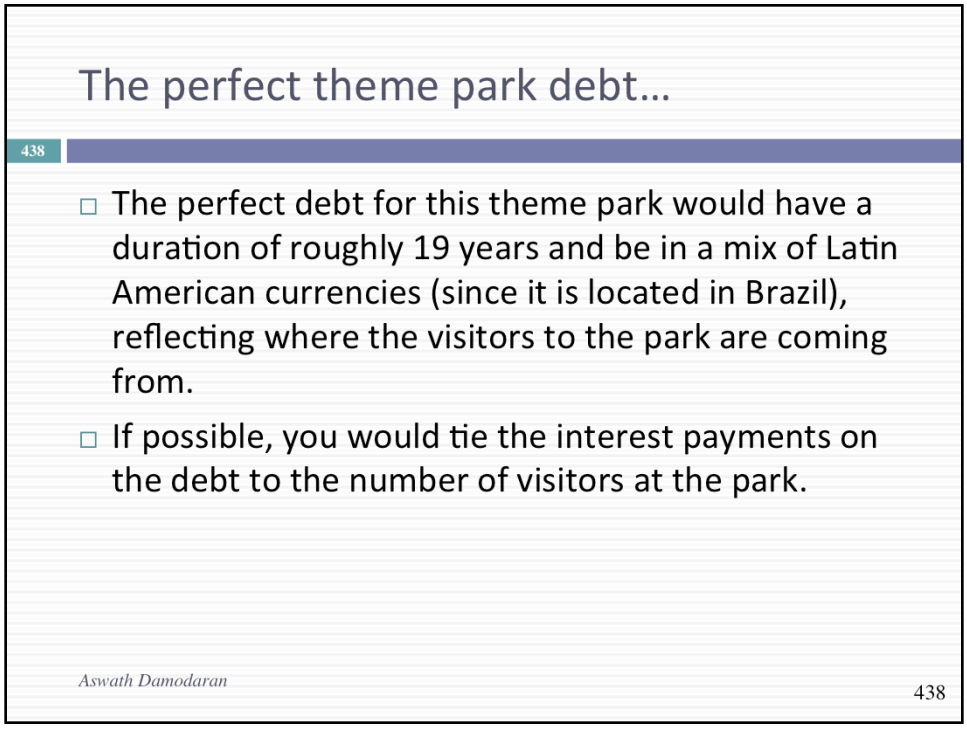
Duration of the Project = 62,355/3296 = 18.92 years

We have used the projected cash flows on the Disney theme park to estimate the duration of the theme park.

This understates the duration,

Since cash flows are likely to drop if interest rates go up

Since we have arbitrarily estimated a terminal value at the end of year 10.



It is entirely possible that the park will pull visitors from a wider global area (say Australia and New Zealand), in which case we should alter the currency mix.

III. Firm-wide financing

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- Rather than look at individual projects, you could consider the firm to be a portfolio of projects. The firm's past history should then provide clues as to what type of debt makes the most sense.
- Operating Cash Flows
  - The question of how sensitive a firm's asset cash flows are to a variety of factors, such as interest rates, inflation, currency rates and the economy, can be directly tested by regressing changes in the operating income against changes in these variables.
  - This analysis is useful in determining the coupon/interest payment structure of the debt.
- Firm Value
  - The firm value is clearly a function of the level of operating income, but it also incorporates other factors such as expected growth & cost of capital.
  - The firm value analysis is useful in determining the overall structure of the debt, particularly maturity.

Each measures a different aspect of the firm.

The operating cash flows measure the year-to-year capacity of the firm to generate cash flows.

Firm value reflects current operating income, as well as the expected growth and the cost of capital.

Disney: Historical Data

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Date	Operating Income	Enterprise Value (V)	% Chg in OI	% Chg in V
2013	9450	$126,815	6.62%	21.09%
2012	8863	$104,729	13.91%	56.85%
2011	7781	$66,769	15.69%	-9.19%
2010	6726	$73,524	18.06%	22.84%
2009	5697	$59,855	-23.06%	-18.11%
2008	$7,404	$73,091	8.42%	-6.27%
2007	$6,829	$77,980	27.53%	2.98%
2006	$5,355	$75,720	30.39%	27.80%
2005	$4,107	$59,248	1.46%	2.55%
2004	$4,048	$57,776	49.21%	9.53%
2003	$2,713	$52,747	13.80%	20.45%
2002	$2,384	$43,791	-15.82%	-9.01%
2001	$2,832	$48,128	12.16%	-45.53%
2000	$2,525	$88,355	-22.64%	35.67%
1999	$3,264	$65,125	-15.07%	-5.91%
1998	$3,843	$69,213	-2.59%	6.20%
1997	$3,945	$65,173	30.46%	18.25%
1996	$3,024	$55,116	33.69%	77.65%
1995	$2,262	$31,025	25.39%	39.75%
1994	$1,804	$22,200	15.64%	9.04%
1993	$1,560	$20,360	21.21%	6.88%
1992	$1,287	$19,049	28.19%	23.89%
1991	$1,004	$15,376	-21.99%	26.50%
1990	$1,287	$12,155	16.05%	-23.64%
1989	$1,109	$15,918	40.56%	101.93%
1988	$789	$7,883	11.60%	-23.91%
1987	$707	$10,360	53.03%	83.69%
1986	$462	$5,640	25.20%	61.23%
1985	$369	$3,498	157.99%	24.37%

Disney has changed changed considerably over time in terms of its business mix. It has increasingly moved into the broadcasting business and its animated movies are only a small portion of its overall movie offerings.

The firm value is the market value of equity plus the book value of debt outstanding in each year. (I would have preferred to use market value of debt, but book value seems like a reasonable proxy)

In doing this table, we reverted back to reported EBIT, rather than using the adjusted EBIT that we have been working with so far.

The Macroeconomic Data

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Date	Change in T.Bond rate	% Chg in GDP	% Change in CPI	% Change in US $
2013	1.07%	1.83%	1.18%	4.89%
2012	-0.11%	2.20%	-1.03%	2.75%
2011	-1.37%	1.81%	1.48%	-4.59%
2010	-0.53%	2.39%	1.97%	-3.64%
2009	1.29%	-3.07%	-3.98%	5.79%
2008	-1.44%	-1.18%	-4.26%	10.88%
2007	-0.65%	2.93%	2.19%	-11.30%
2006	0.30%	3.40%	-1.84%	-2.28%
2005	0.16%	3.68%	0.66%	3.98%
2004	0.13%	3.72%	1.34%	-3.92%
2003	0.05%	4.32%	-0.65%	-14.59%
2002	-0.97%	2.80%	1.44%	-11.17%
2001	-0.18%	-0.04%	-2.50%	7.45%
2000	-0.98%	2.24%	0.96%	7.73%
1999	1.56%	4.70%	1.04%	1.68%
1998	-1.03%	4.51%	0.11%	-4.08%
1997	-0.63%	4.33%	-1.43%	9.40%
1996	0.80%	4.43%	0.31%	4.14%
1995	-2.09%	2.01%	-0.08%	-0.71%
1994	1.92%	4.12%	0.27%	-5.37%
1993	-0.83%	2.50%	-0.72%	0.56%
1992	-0.02%	4.15%	0.64%	6.89%
1991	-1.26%	1.09%	-2.89%	0.69%
1990	0.12%	0.65%	0.43%	-8.00%
1989	-1.11%	2.66%	0.51%	2.04%
1988	0.26%	3.66%	0.60%	1.05%
1987	1.53%	4.49%	2.54%	-12.01%
1986	-1.61%	2.83%	-2.33%	-15.26%
1985	-2.27%	4.19%	3.89%	-13.51%

This would apply to any firm that we would analyze over this time period.

I. Sensitivity to Interest Rate Changes

- How sensitive is the firm's value and operating income to changes in the level of interest rates?
- The answer to this question is important because it
  - it provides a measure of the duration of the firm's projects
  - it provides insight into whether the firm should be using fixed or floating rate debt.

How much has firm value changed for a given change in interest rates?

Firm Value versus Interest Rate Changes

443

- Regressing changes in firm value against changes in interest rates over this period yields the following regression –

  Change in Firm Value = 0.1790 – 2.3251 (Change in Interest Rates)

  (2.74) (0.39)

  - T statistics are in brackets.
- The coefficient on the regression (-2.33) measures how much the value of Disney as a firm changes for a unit change in interest rates.

These regressions tend to be noisy, even for firms with substantial historical data.

Industry-average coefficients might provide more reliable estimates (just as sector betas are often better than firm-specific betas)

Why the coefficient on the regression is duration..

444

- The duration of a straight bond or loan issued by a company can be written in terms of the coupons (interest payments) on the bond (loan) and the face value of the bond to be –

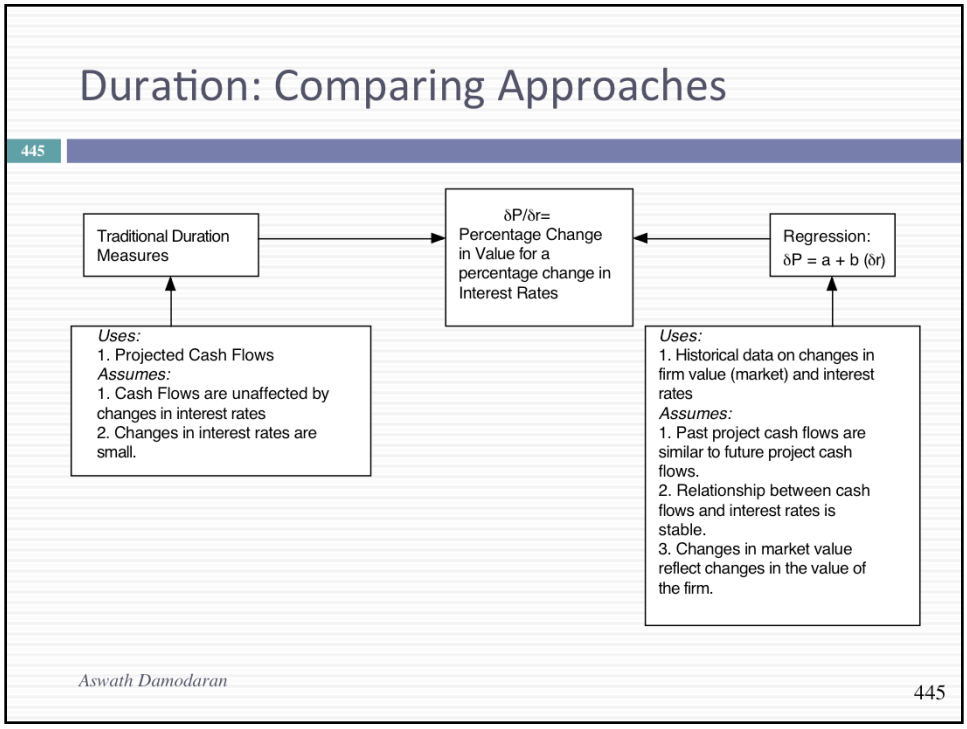
$$\text{Duration of Bond} = \frac{dP/P}{dr/r} = \frac{\left[\sum_{t=1}^{t=N} \frac{t*\text{Coupon}_t}{(1+r)^t} + \frac{N*\text{Face Value}}{(1+r)^N}\right]}{\left[\sum_{t=1}^{t=N} \frac{\text{Coupon}_t}{(1+r)^t} + \frac{\text{Face Value}}{(1+r)^N}\right]}$$

- The duration of a bond measures how much the price of the bond changes for a unit change in interest rates.
- Holding other factors constant, the duration of a bond will increase with the maturity of the bond, and decrease with the coupon rate on the bond.

This is a traditional Macaulay duration. It is a measure of the percentage change in the bond price for a 1% change in interest rates.

Equivalently, it can be viewed as the maturity of a zero-coupon bond with the same sensitivity to interest rate changes.

Note, in the regression on the previous page, the coefficient on the change in interest rates, measures the percentage change in firm value for a 1% change in interest rates. Thus, the regression coefficient also measures duration.



It is very difficult to estimate Macaulay Duration on a project-by-project basis for all the projects that a firm has.

It is much easier to run the regression, but the results are likely to be noisy and affected by whether the firm's business mix has changed over time.

This leaves us with

- The intuitive analysis that preceded this section
- Industry average duration numbers, which can be used for any firm in that industy

Operating Income versus Interest Rates

- Regressing changes in operating cash flow against changes in interest rates over this period yields the following regression –

Change in Operating Income = 0.1698 – 7.9339 (Change in Interest Rates)
(2.69[a]) (1.40)

Conclusion: Disney's operating income has been affected a lot more than its firm value has by changes in interest rates.

This measures the effect of interest rates on operating income. Firm value will be affected more because discount rates tend to also go up when interest rates increase.

II. Sensitivity to Changes in GDP/ GNP

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- How sensitive is the firm's value and operating income to changes in the GNP/GDP?
- The answer to this question is important because
  - it provides insight into whether the firm's cash flows are cyclical and
  - whether the cash flows on the firm's debt should be designed to protect against cyclical factors.
- If the cash flows and firm value are sensitive to movements in the economy, the firm will either have to issue less debt overall, or add special features to the debt to tie cash flows on the debt to the firm's cash flows.

Is the firm a cyclical firm? Cyclical firms should have operating income that moves with the economy. Value might not, since markets can look past cycles. In this case, the operating income regression may be the more valuable one.

Regression Results

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- Regressing changes in firm value against changes in the GDP over this period yields the following regression –

Change in Firm Value = 0.0067 + 6.7000 (GDP Growth)
(0.06) (2.03[a])

Conclusion: Disney is sensitive to economic growth

- Regressing changes in operating cash flow against changes in GDP over this period yields the following regression –

Change in Operating Income = 0.0142 + 6.6443 (GDP Growth)
(0.13) (2.05[a])

Conclusion: Disney's operating income is sensitive to economic growth as well.

Disney has increasingly become a cyclical firm. (In previous iterations in 1997 and 2003, it was insensitive to economic growth. In the 2009 regression, it became mildly cyclical and it continues to be so.) This may reflect its increasing dependence on broadcasting (where advertising is cyclical) and grown up movies.

III. Sensitivity to Currency Changes

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- How sensitive is the firm's value and operating income to changes in exchange rates?
- The answer to this question is important, because
  - it provides a measure of how sensitive cash flows and firm value are to changes in the currency
  - it provides guidance on whether the firm should issue debt in another currency that it may be exposed to.
- If cash flows and firm value are sensitive to changes in the dollar, the firm should
  - figure out which currency its cash flows are in;
  - and issued some debt in that currency

Again, we are assuming that the historical exposure of earnings and firm value to currencies is a good measure of future exposure.

Regression Results

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- Regressing changes in firm value against changes in the dollar over this period yields the following regression –

Change in Firm Value = 0.1774– 0.5705 (Change in Dollar)
(2.76) (0.67)

Conclusion: Disney's value is sensitive to exchange rate changes, decreasing as the dollar strengthens. However, the effect is statistically insignificant.

- Regressing changes in operating cash flow against changes in the dollar over this period yields the following regression –

Change in Operating Income = 0.1680 – 1.6773 (Change in Dollar)
(2.82[a]) (2.13[a])

Conclusion: Disney's operating income is more strongly impacted by the dollar than its value is. A stronger dollar seems to hurt operating income.

The negative effect of the stronger dollar on operating income might reflect the revenues that Disney gets from tourists at its theme parks. These tourists are less likely to visit the theme parks when the dollar is stronger. While firm value also goes down, the effect is less significant.

IV. Sensitivity to Inflation

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- How sensitive is the firm's value and operating income to changes in the inflation rate?
- The answer to this question is important, because
  - it provides a measure of whether cash flows are positively or negatively impacted by inflation.
  - it then helps in the design of debt; whether the debt should be fixed or floating rate debt.
- If cash flows move with inflation, increasing (decreasing) as inflation increases (decreases), the debt should have a larger floating rate component.

We are assuming that year-to-year changes in interest rates are driven primarily by changes in inflation.

Regression Results

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- Regressing changes in firm value against changes in inflation over this period yields the following regression –

Change in Firm Value = 0.1855 + 2.9966 (Change in Inflation Rate)

(2.96) (0.90)

Conclusion: Disney's firm value does seem to increase with inflation, but not by much (statistical significance is low)

- Regressing changes in operating cash flow against changes in inflation over this period yields the following regression –

Change in Operating Income = 0.1919 + 8.1867 (Change in Inflation Rate)

(3.43[a]) (2.76[a])

Conclusion: Disney's operating income increases in periods when inflation increases, suggesting that Disney does have pricing power.

Operating income tends to move with inflation, but firm value is not affected as much. This is not surprising, if cash flow effects and discount rate effects cancel out.

I would weigh the operating income regression more in determining whether to use floating rate or fixed rate debt, since the cash flows each year go towards paying the coupons.

Summarizing…

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- Looking at the four macroeconomic regressions, we would conclude that
  - Disney's assets collectively have a duration of about 2.33 years
  - Disney is increasingly affected by economic cycles
  - Disney is hurt by a stronger dollar
  - Disney's operating income tends to move with inflation
- All of the regression coefficients have substantial standard errors associated with them. One way to reduce the error (a la bottom up betas) is to use sector-wide averages for each of the coefficients.

Summarizes the results of the regressions… Caveat: The regressions have low R-squareds and any or all of these estimates could be wrong by a large amount.

Bottom-up Estimates

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These weights reflect the estimated values of the businesses

Business	*Interest rates*	*GDP Growth*	*Inflation*	*Currency*	*Weights*
Media Networks	-3.70	0.56	1.41	-1.23	49.27%
Parks & Resorts	-4.50	0.70	-3.05	-1.58	33.81%
Studio Entertainment	-6.47	0.22	-1.45	-3.21	13.49%
Consumer Products	-4.88	0.13	-5.51	-3.01	2.18%
Interactive	*-1.01*	*0.25*	*-3.55*	*-2.86*	1.25%
Disney Operations	-4.34	0.55	-0.70	-1.67	100.00%

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Since the standard errors on the regression estimates are so high, this alternative may yield more precise estimates of the each of the coefficients. To obtain these bottom up values, we ran the regressions for each firm in the sector and averaged out the coefficients.

Recommendations for Disney

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- The debt issued should be long term and should have duration of about 4.3 years.
- A significant portion of the debt should be floating rate debt, reflecting Disney's capacity to pass inflation through to its customers and the fact that operating income tends to increase as interest rates go up.
- Given Disney's sensitivity to a stronger dollar, a portion of the debt should be in foreign currencies. The specific currency used and the magnitude of the foreign currency debt should reflect where Disney makes its revenues. Based upon 2013 numbers at least, this would indicate that about 18% of its debt should be in foreign currencies (and perhaps more, since even their US dollar income can be affected by currency movements).

Converts the numbers into tangible recommendations…

Analyzing Disney's Current Debt

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- Disney has $14.3 billion in interest-bearing debt with a face-value weighted average maturity of 7.92 years. Allowing for the fact that the maturity of debt is higher than the duration, this would indicate that Disney's debt may be a little longer than would be optimal, but not by much.
- Of the debt, about 5.49% of the debt is in non-US dollar currencies (Indian rupees and Hong Kong dollars), but the rest is in US dollars and the company has no Euro debt. Based on our analysis, we would suggest that Disney increase its proportion of Euro debt to about 12% and tie the choice of currency on future debt issues to its expansion plans.
- Disney has no convertible debt and about 5.67% of its debt is floating rate debt, which looks low, given the company's pricing power. While the mix of debt in 2013 may be reflective of a desire to lock in low long-term interest rates on debt, as rates rise, the company should consider expanding its use of foreign currency debt.

There may be good reasons for the mismatch but for most firms, the existing debt structure is more a result of history and inertia. Disney's business mix has changed significantly over the last decade - more broadcasting, less theme park - and it is not surprising that the debt structure has not kept pace.

In some cases, market frictions and limitations may contribute to the mismatch. In fact, many emerging market companies were unable to borrow long term until recently because banks would not lend long term in those markets.

Adjusting Debt at Disney

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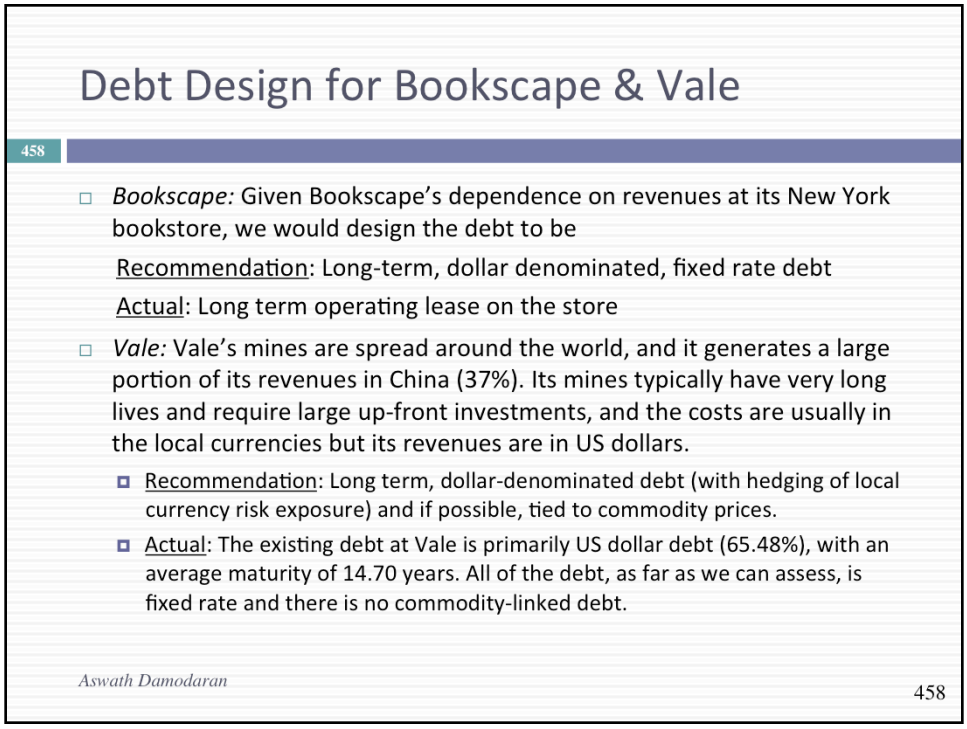
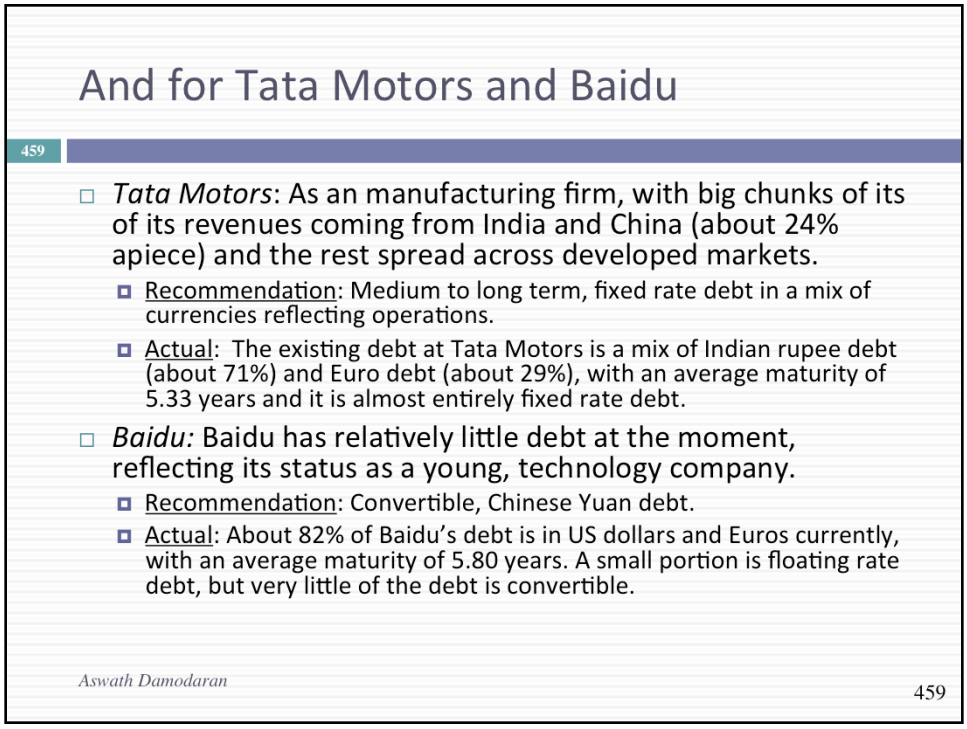
- It can swap some of its existing fixed rate, dollar debt for floating rate, foreign currency debt. Given Disney's standing in financial markets and its large market capitalization, this should not be difficult to do.
- If Disney is planning new debt issues, either to get to a higher debt ratio or to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

Disney's large size and access to capital markets give it lots of options. Smaller firms and emerging market firms will have fewer options. In the extreme scenario, it may take more time to adjust the debt.



We don't even try to assess Deutsche's right debt because its assets are constantly changing and debt plays a different role in a bank… it is more raw material than source of capital.

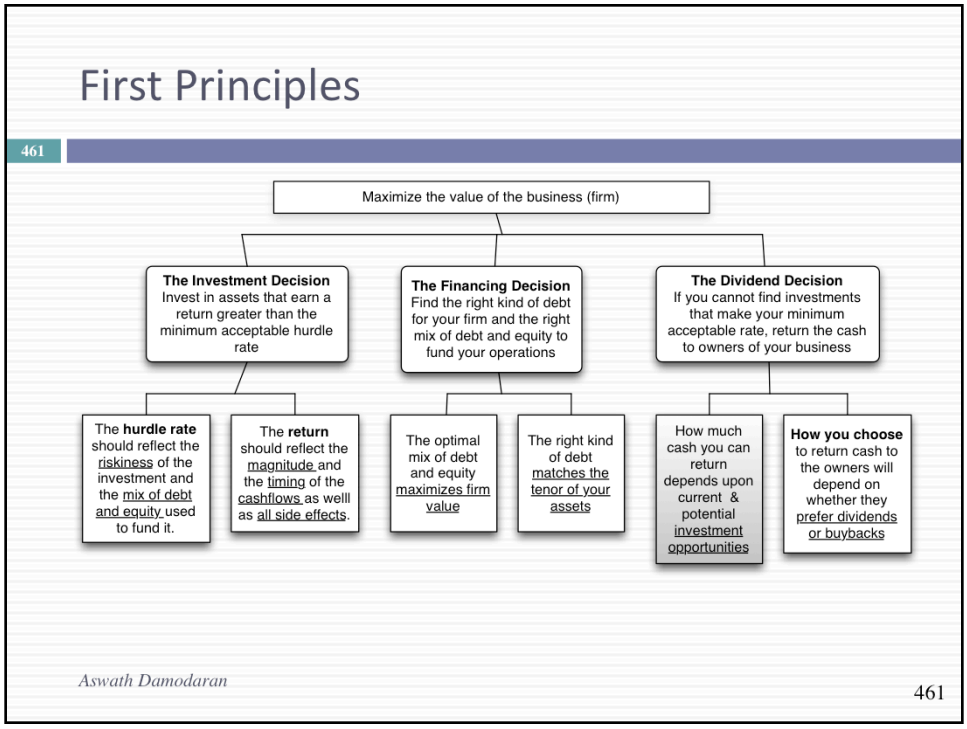


As emerging market companies, they had few choices a decade or so ago. Now, their choices have increased as corporate bond markets have opened up domestically and both firms have access to foreign capital markets.

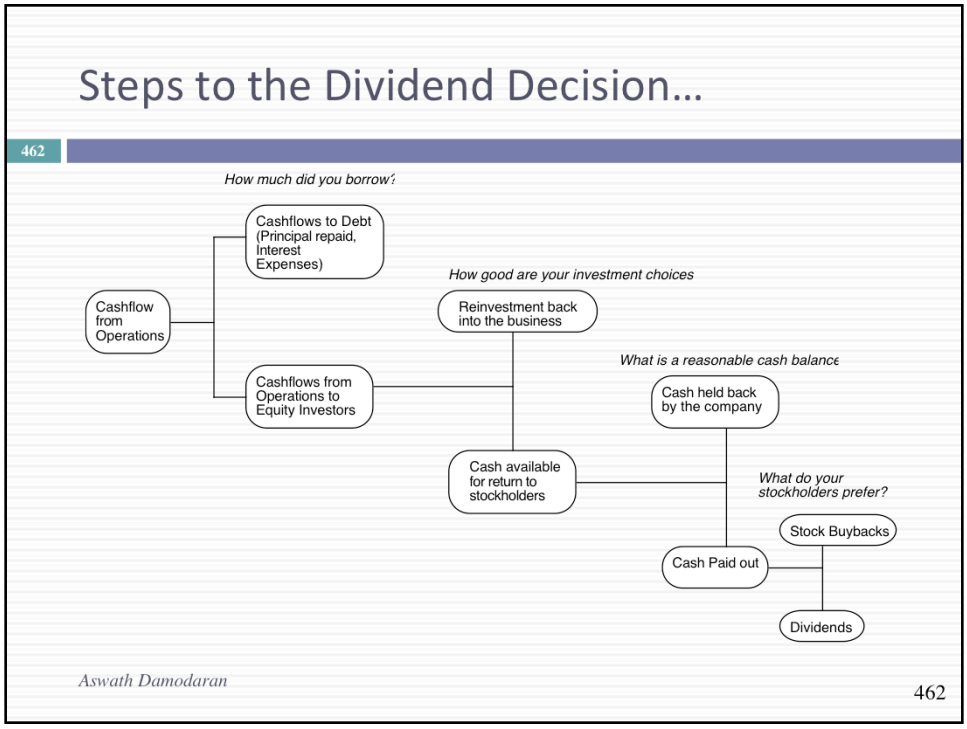
RETURNING CASH TO THE OWNERS: DIVIDEND POLICY

"Companies don't have cash. They hold cash for their stockholders."

The final piece of the corporate finance puzzle.



The end game in corporate finance.



Dividend policy is affected by investment and financing decisions…. And dividend decisions may affect investment and financing decisions. In other words, analyzing dividends has to be part and parcel of analyzing the whole company.

I. Dividends are sticky

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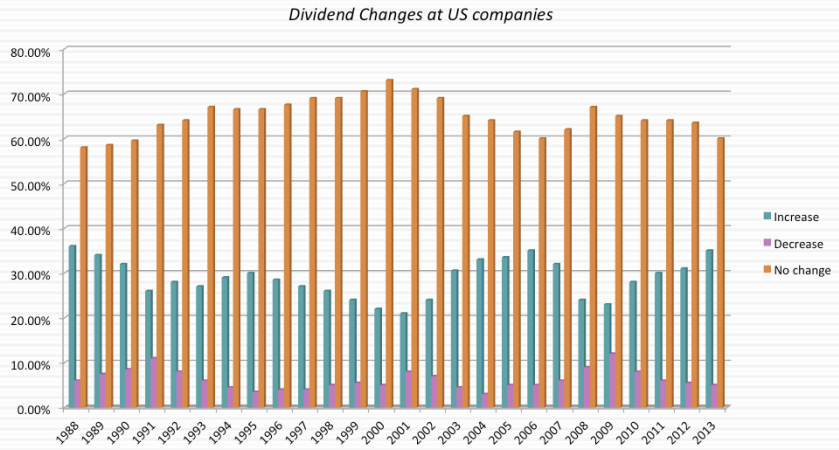

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Most companies in most years pay out what they did last year as dividends. Among firms that change dividends, increases are more common than decreases.

The last quarter of 2008 put stickiness to the test.. Number of S&P 500 companies that…

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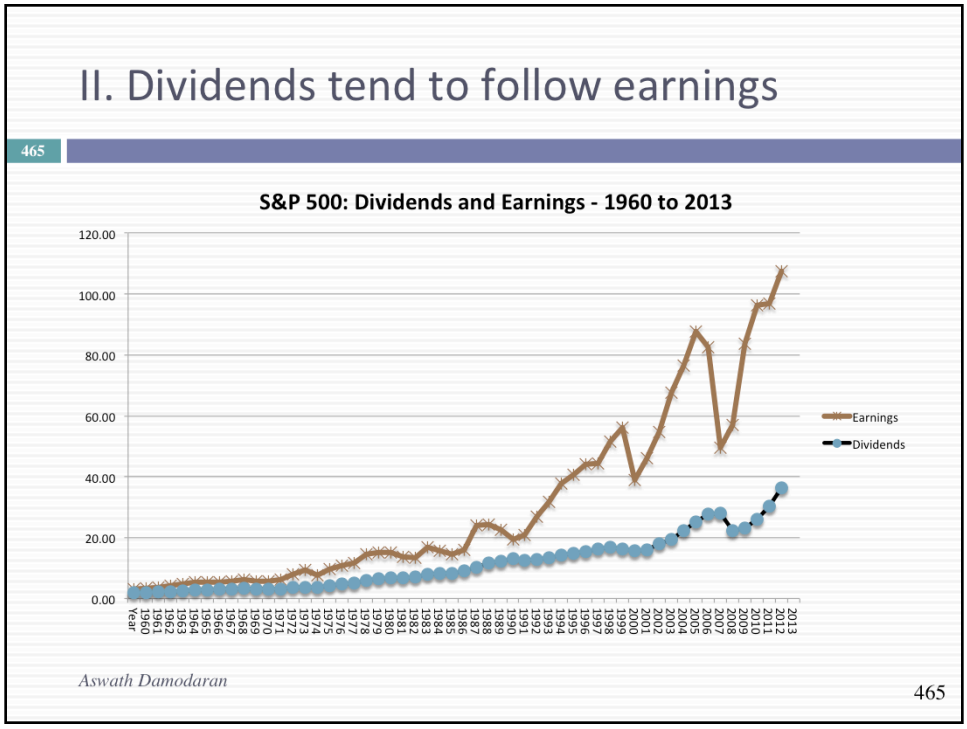
Quarter	Dividend Increase	Dividend initiated	Dividend decrease	Dividend suspensions
Q1 2007	102	1	1	1
Q2 2007	63	1	1	5
Q3 2007	59	2	2	0
Q4 2007	63	7	4	2
Q1 2008	93	3	7	4
Q2 2008	65	0	9	0
Q3 2008	45	2	6	8
Q4 2008	32	0	17	10

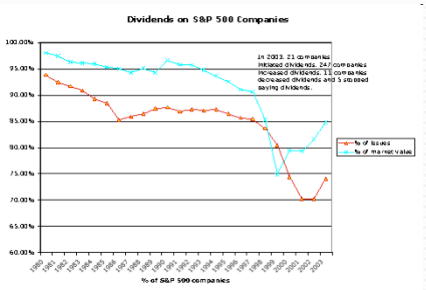
If there was a quarter than should have shaken up the policy of leaving dividends unchanged, it should have been the last quarter of 2008, when markets collapsed globally and there were fears of a credit crisis. In the face of this mountain of bad news, more companies still increased dividends than suspended or cut them.



Dividends tend to follow earnings. They don't lead them and they are not contemporaneous. In other words, don't expect a company to pay out more in dividends if their earnings go up… If earnings go up two years in a row, maybe.. Three years in a row and the odds increase.

III. Are affected by tax laws…

In 2003



In the last quarter of 2012

- As the possibility of tax rates reverting back to pre-2003 levels rose, 233 companies paid out $31 billion in dividends.
- Of these companies, 101 had insider holdings in excess of 20% of the outstanding stock.

In 2003, for the first time in decades, the tax rate on dividends was cut to 15% to match the tax rate on capital gains. How firms responded in terms of dividend policy is a good test of the tax effect.

More firms initiated dividends in 2003 and more dividends were paid, but the effect was muted. Stock buybacks still overwhelmed dividends.

The lesson: Taxes may affect dividend policy but they are not the key determinant.

In the last quarter of 2012, with the fiscal cliff looming (where tax rates on dividend income could have doubled for investors), companies paid out huge amounts in special dividends.

IV. More and more firms are buying back stock, rather than pay dividends...

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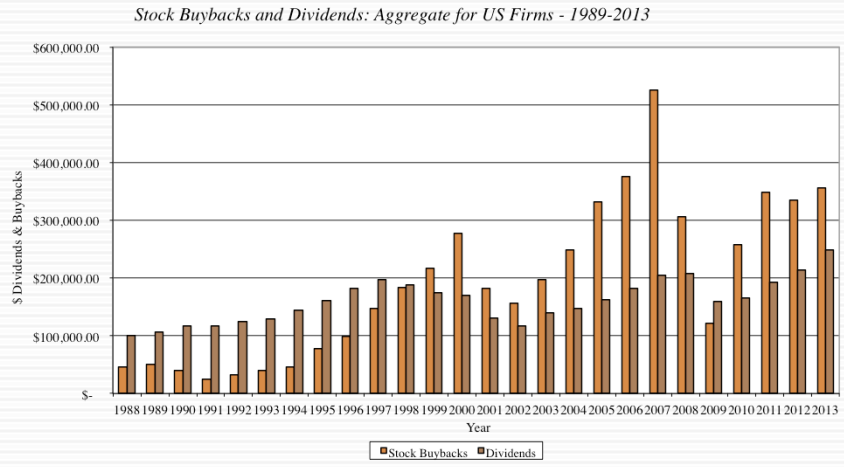

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This trend accelerated through the 1990s. It can be partially explained by

1. An increase in the volatility of earnings at all companies, making dividends much more difficult to maintain
2. An increasing proportion of investors who invested primarily for capital gains
3. Managers being compensated with options like stock buybacks more than dividends since the latter leads to lower stock prices.

Dividend policy vary across countries.

1. *Differences in Stage of Growth*: Just as higher-growth companies tend to pay out less of their earnings in dividends countries with higher growth pay out less in dividends. For instance, Japan had much higher expected growth in 1982–84 than the other G-7 countries and paid out a much smaller percentage of its earnings as dividends. As Japan's growth declined, its payout ratio has risen.

2. *Differences in Tax Treatment*: Unlike the United States, where dividends are doubly taxed, some countries provide at least partial protection against the double taxation of dividends. For instance, Germany taxes corporate retained earnings at a higher rate than corporate dividends and the United Kingdom allows investors to offset corporate taxes against taxes due on dividends, thus reducing the effective tax rate on dividends.

3. *Differences in Corporate Control:* When there is a separation between ownership and management, as there is in many large publicly traded firms, and where stockholders have little control over managers, the dividends paid by firms will be lower. Managers, left to their own devices, have an incentive to accumulate cash. Russia, with its abysmal corporate governance system, has a dividend payout ratio of less than 10% in 2009.

4. Stock buyback restrictions: Especially in earlier perods, non_US companies faced restrictions on stock buybacks.

Not surprisingly, the dividend payout ratios of companies in most emerging markets are much lower than the dividend payout ratios in the G-7 countries. The higher growth and relative power of incumbent management in these countries contribute to keeping these payout ratios low.

Measures of Dividend Policy

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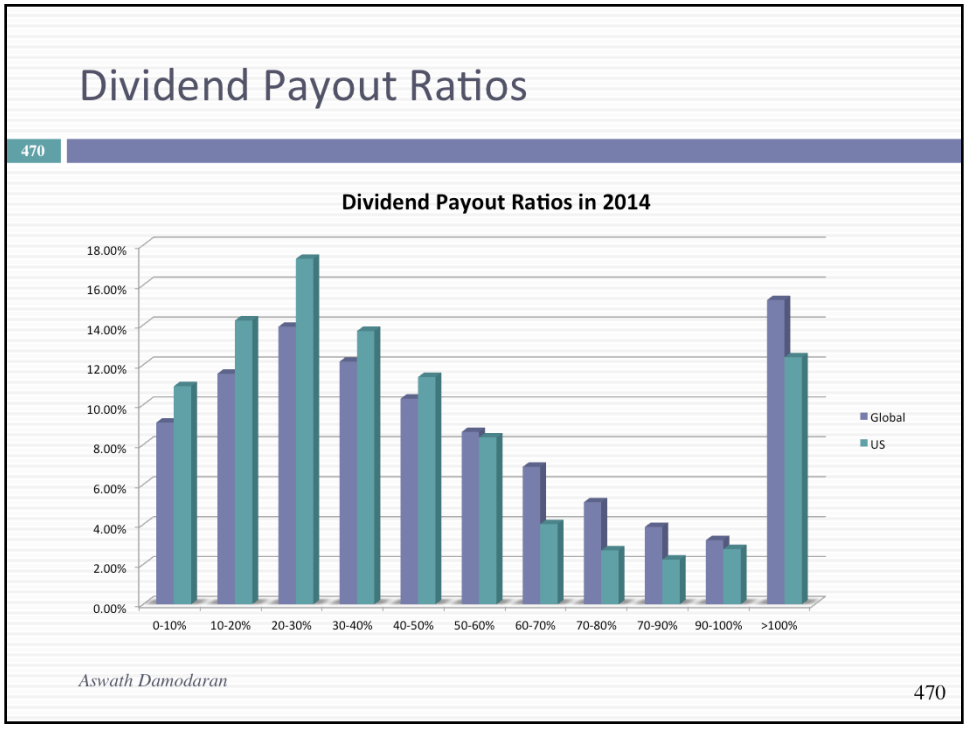
- Dividend Payout = Dividends/ Net Income
  - Measures the percentage of earnings that the company pays in dividends
  - If the net income is negative, the payout ratio cannot be computed.
- Dividend Yield = Dividends per share/ Stock price
  - Measures the return that an investor can make from dividends alone
  - Becomes part of the expected return on the investment.

These are the two most common measures of dividend. They both focus on traditional dividends, and could be modified to include stock buybacks.



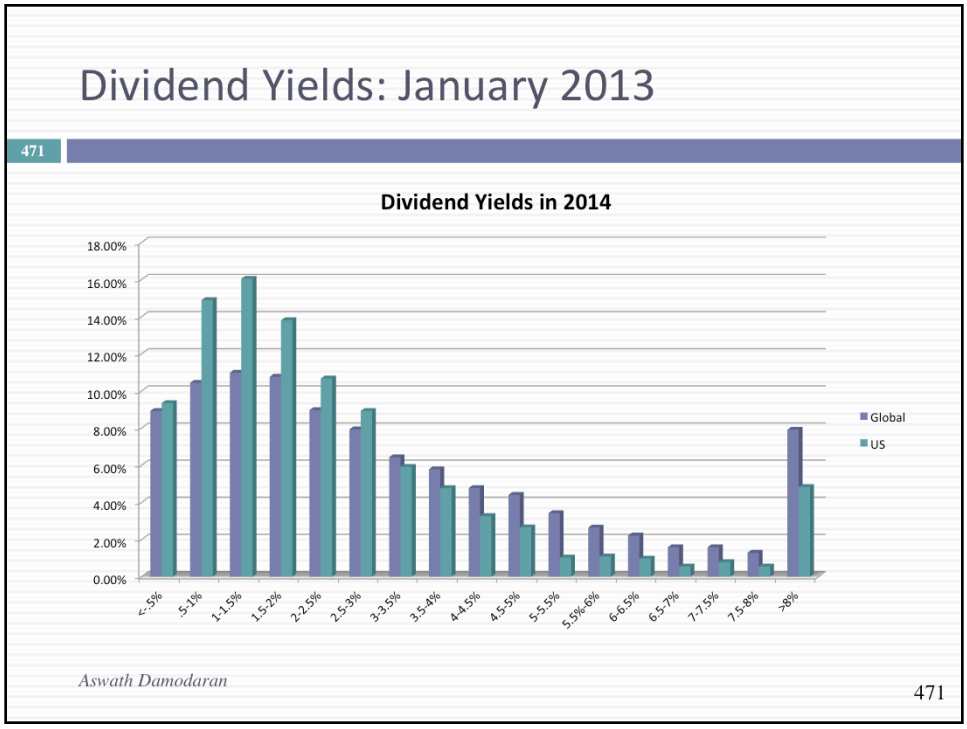
The median payout ratio is about 20%-25% for US firms that pay dividends. It is higher for global firms (about 35-40%)

More firms (about 75% of all US firms and 60% of global firms), however, do not pay dividends than do pay dividends. The trend in the number of non-dividend paying firms has been upwards over the last few decades.

Finally, a few interesting outliers.

The firms that have dividend payout ratios of more than 100% may seem irrational but there are three possible explanations:

1. Firms having a bad year in earnings, but expect earnings to bounce back.. They continue to pay dividends based upon their normalized earnings
2. Very stable firms that have little capital expenditures but large depreciation. Their cash flows (which they use for dividends) vastly exceed earnings. These firms are gradually liquidating themselves over time.
3. Firms that are under levered are paying more in dividends than earnings and funding the difference with new debt to increase debt ratios.

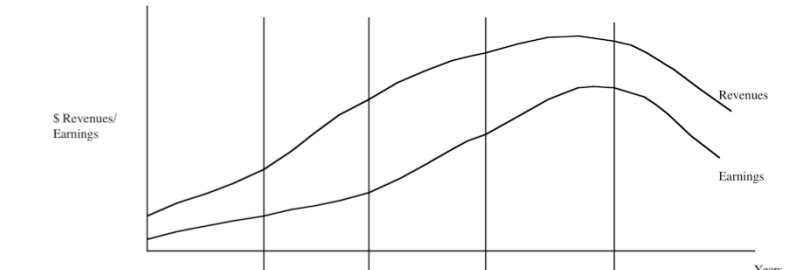


Here again, there is a trend. Over the last two decades, the dividend yield for U.S. firms has decreased across the board.

In 2009, dividend yields shot up, not because dividends increased but stock prices decreased. In 2010, they were back down again, as stock prices rebounded.

Bottom line: Volatility in dividend yields is caused more by changes in the denominator (stock prices) than in the numerator (dividends)

Figure 10.7: Life Cycle Analysis of Dividend Policy



External funding needs	High, but constrained by infrastructure	High, relative to firm value.	Moderates, relative to firm value.	Low, as projects dry up.	Low, as projects dry up.
Internal financing	Negative or low	Negative or low	Low, relative to funding needs	High, relative to funding needs	More than funding needs
Capacity to pay dividends	None	None	Very low	Increasing	High
Growth stage	Stage 1 Start-up	Stage 2 Rapid Expansion	Stage 3 High Growth	Stage 4 Mature Growth	Stage 5 Decline

Years

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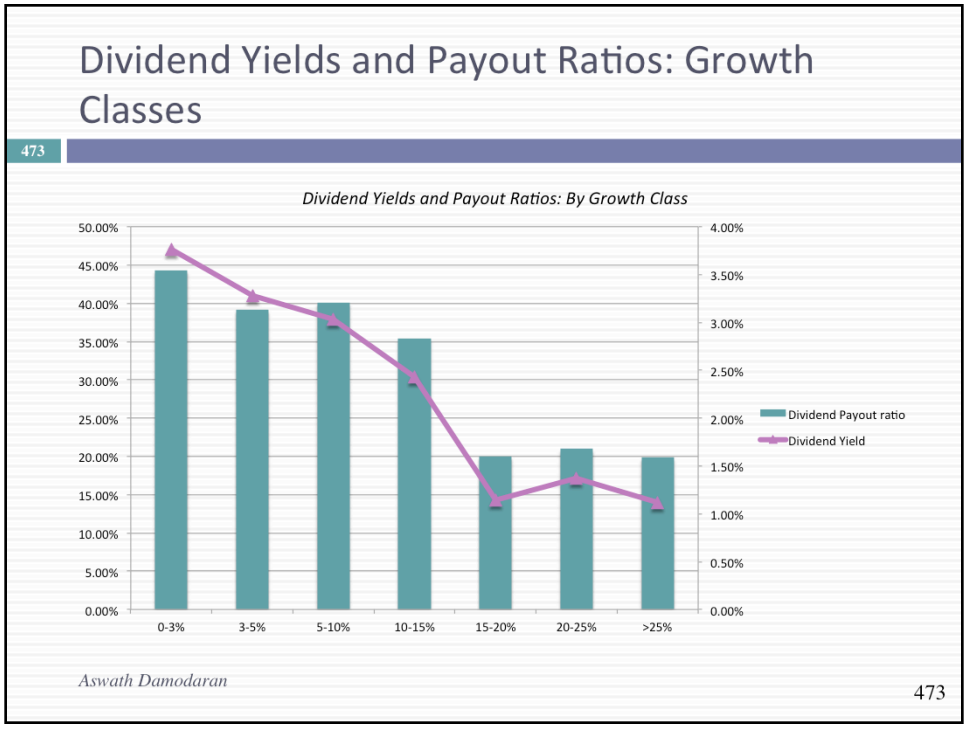
One way of assessing dividend policy is to look at where a firm stands in the life cycle. As firms grow and mature, their capacity to generate excess cash flows and pay dividends should increase….



Some backing for the life cycle story.

These are US firms, categorized based upon expected growth in earnings. As earnings growth increases, both dividend yields and payout ratios decrease.

Dividend Policy: Disney, Vale, Tata Motors, Baidu and Deutsche Bank

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	Disney	Vale	Tata Motors	Baidu	Deutsche Bank
Dividend Yield - Last 12 months	1.09%	6.56%	1.31%	0.00%	1.96%
Dividend Payout ratio - Last 12 months	21.58%	113.45%	16.09%	0.00%	362.63%
Dividend Yield - 2008-2012	1.17%	4.01%	1.82%	0.00%	3.14%
Dividend Payout - 2008-2012	17.11%	37.69%	15.53%	0.00%	37.39%

Other than Baidu, all of the companies paid dividends. While the payout ratio was low for Disney and Tata Motors, it is more than 100% for Vale (perhaps reflecting expectations that the company's earnings will bounce back) and Deutsche (for the same reason). The low dividend yield for all of the companies, other than Vale, indicate that as investors it is price appreciation that will determine whether you earn a reasonable return on these companies, not dividends.

Three Schools Of Thought On Dividends

1. If there are no tax disadvantages associated with dividends & companies can issue stock, at no issuance cost, to raise equity, whenever needed

Dividends do not matter, and dividend policy does not affect value.

2. If dividends create a tax disadvantage for investors (relative to capital gains)

Dividends are bad, and increasing dividends will reduce value

3. If dividends create a tax advantage for investors (relative to capital gains) and/or stockholders like dividends

Dividends are good, and increasing dividends will increase value

Note that the schools span the spectrum. Firms which increase, decrease or do nothing on dividends can all find something in one of these schools to justify their actions.

There is truth in each of these schools of thought. The key to sensible dividend analysis is extracting that which makes sense from each school and bringing them all together in a composite analysis.

The balanced viewpoint

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

These propositions are really not about dividends, but about returning cash to the owners of the business. Firms which want to return money to stockholders can buy back stock or pay dividends.

The Dividends don't matter school
The Miller Modigliani Hypothesis

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- The Miller-Modigliani Hypothesis: Dividends do not affect value
- Basis:
  - If a firm's investment policies (and hence cash flows) don't change, the value of the firm cannot change as it changes dividends.
  - If a firm pays more in dividends, it will have to issue new equity to fund the same projects. By doing so, it will reduce expected price appreciation on the stock but it will be offset by a higher dividend yield.
  - If we ignore personal taxes, investors have to be indifferent to receiving either dividends or capital gains.
- Underlying Assumptions:

  (a) There are no tax differences to investors between dividends and capital gains.

  (b) If companies pay too much in cash, they can issue new stock, with no flotation costs or signaling consequences, to replace this cash.

  (c) If companies pay too little in dividends, they do not use the excess cash for bad projects or acquisitions.

This summarizes the MM argument for why dividend policy is irrelevant.

1. Generally, firms that pay too much in dividends lose value because they cannot take value-creating projects that they should. In the MM world, this cost is eliminated by assuming that these firms can raise the capital (with no transactions costs and no frictions) to take these projects.
2. Investors who receive dividends often face a much larger tax bill than investors who get capital gains. This is eliminated by assuming that there are no tax disadvantages associated with dividends.
3. Intuitively, the MM proposition argues that your total returns on a stock will be unaffected by dividend policy.

II. The Dividends are "bad" school: And the evidence to back them up…

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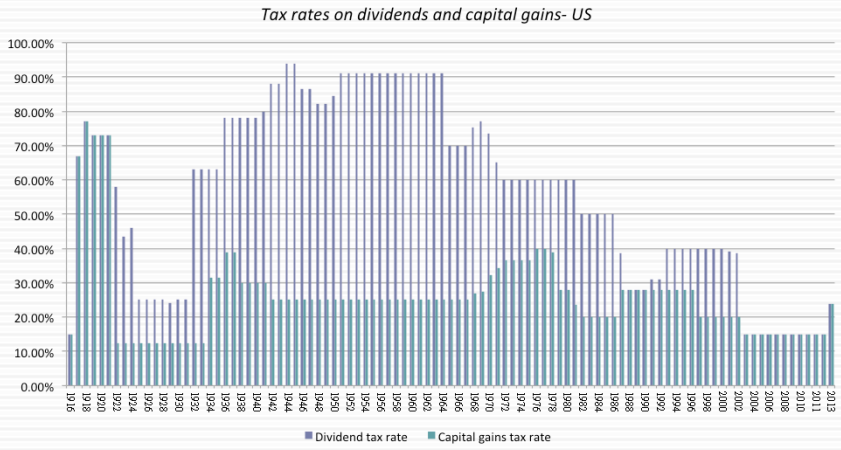

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This has generally been true in the United States, but is not always the case in other markets. For instance, in the UK, where investors are allowed to offset the corporate tax paid on dividends against their taxes, dividends may have a tax advantage for some investors over capital gains.

There are several markets where capital gains are not taxed at all and some where neither dividends nor capital gains are taxed.

What do investors in your stock think about dividends? Clues on the ex-dividend day!

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- Assume that you are the owner of a stock that is approaching an ex-dividend day and you know that dollar dividend with certainty. In addition, assume that you have owned the stock for several years.

P = Price at which you bought the stock a "while" back

P_b= Price before the stock goes ex-dividend

P_a=Price after the stock goes ex-dividend

D = Dividends declared on stock

t_o, t_{cg} = Taxes paid on ordinary income and capital gains respectively

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One of the toughest questions to answer is whether stockholders in your firms specifically pay higher taxes on dividends or capital gains. You may be able to look at how the stock price behaves on the ex-dividend day to get an answer.

Cashflows from Selling around Ex-Dividend Day

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- The cash flows from selling before ex-dividend day are:

  $P_b - (P_b - P)\, t_{cg}$

- The cash flows from selling after ex-dividend day are:

  $P_a - (P_a - P)\, t_{cg} + D(1-t_o)$

- Since the average investor should be indifferent between selling before the ex-dividend day and selling after the ex-dividend day -

  $P_b - (P_b - P)\, t_{cg} = P_a - (P_a - P)\, t_{cg} + D(1-t_o)$

- Some basic algebra leads us to the following:

$$\frac{P_b - P_a}{D} = \frac{1 - t_o}{1 - t_{cg}}$$

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For this market to be stable, the cash flow from selling before has to be equal to the cash flow from selling after for most of the investors in this firm (or for the median investor).

If, for instance, the cash flow from selling before was greater than the cash flow from selling after for the median investor, the market would collapse, with every one selling before the ex-dividend day.

If the cash flow from selling after was greater for the median investor, every one would hold through the ex-dividend day and sell after.

Differences in tax status will mean, however, that there are profit opportunities for investors whose tax status is very different from that of the median investor.

Intuitive Implications

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- The relationship between the price change on the ex-dividend day and the dollar dividend will be determined by the difference between the tax rate on dividends and the tax rate on capital gains for the typical investor in the stock.

Tax Rates	*Ex-dividend day behavior*
If dividends and capital gains are taxed equally	Price change = Dividend
If dividends are taxed at a higher rate than capital gains	Price change < Dividend
If dividends are taxed at a lower rate than capital gains	Price change > Dividend

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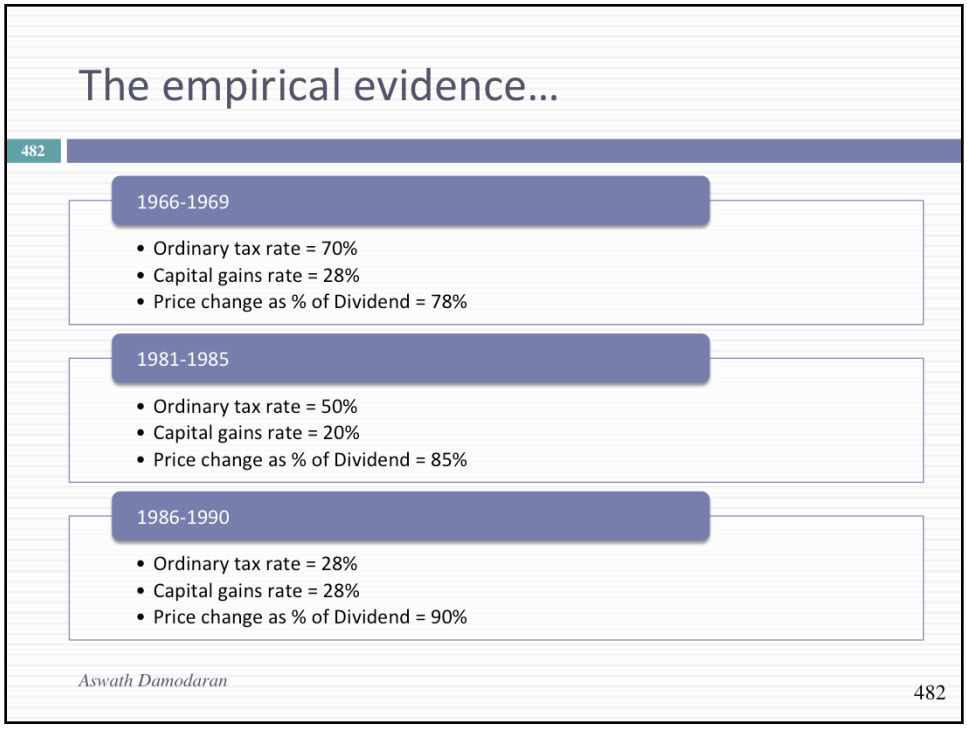
This equality has to hold, in equilibrium, for the median investor in the firm to be indifferent between selling before and selling after.

By looking at price behavior on ex-dividend days, we should be able to get a snap shot of what differential tax rate investors in this stock, on average, face on dividends as opposed to capital gains.

If the price drop is much smaller than the dividend, the median investor, it can be argued, faces a tax rate on dividends that is higher than the tax rate on capital gains.

If it is equal, the median investor faces the same tax rate on both (or does not pay taxes at all)

If the price drop is greater than the dividend, the median investor pays more taxes on capital gains than he or she does on dividends.



As the difference in marginal tax rates has narrowed from what it used be prior to 1981, the trend in the ex-dividend day measure has been towards one. This may also reflect the greater role played by pension funds (which are tax exempt) in the process.

Note, thought, that even in the 1986-90 time period, when dividends and capital gains were taxed at the same rate, the ratio did not converge on one. This indicates that the timing option (you choose when to take capital gains and you have none on dividends) will make dividends less attractive than capital gains even when the tax rates are the same

Dividend Arbitrage

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- Assume that you are a tax exempt investor, and that you know that the price drop on the ex-dividend day is only 90% of the dividend. How would you exploit this differential?
  a. Invest in the stock for the long term
  b. Sell short the day before the ex-dividend day, buy on the ex-dividend day
  c. Buy just before the ex-dividend day, and sell after.
  d. _____

I would buy just before the ex-dividend day and sell after. I will profit as long as the transactions costs are less than the difference between the dividend and the price drop.

Example of dividend capture strategy with tax factors

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- XYZ company is selling for $50 at close of trading May 3. On May 4, XYZ goes ex-dividend; the dividend amount is $1. The price drop (from past examination of the data) is only 90% of the dividend amount.
- The transactions needed by a tax-exempt U.S. pension fund for the arbitrage are as follows:
  - 1. Buy 1 million shares of XYZ stock cum-dividend at $50/share.
  - 2. Wait till stock goes ex-dividend; Sell stock for $49.10/share (50 - 1* 0.90)
  - 3. Collect dividend on stock.
- Net profit = - 50 million + 49.10 million + 1 million = $0.10 million

Note that this is before transactions costs and is exposed to the risk that the market might be down sharply on the day of the transaction.

To reduce these effects, successful dividend capture requires that it be done in large quantities (to reduce the transactions costs) and across a large number of stocks and ex-dividend days (to reduce the market risk)

There is the story of a pension fund manager in Oregon, who after reading about dividend capture, decided to try it out on one stock in a big way. The day happened to be October 19, 1987. Needless to say, he lost his job.

Two bad reasons for paying dividends
1. The bird in the hand fallacy

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- Argument: Dividends now are more certain than capital gains later. Hence dividends are more valuable than capital gains. Stocks that pay dividends will therefore be more highly valued than stocks that do not.
- Counter: The appropriate comparison should be between dividends today and price appreciation today. The stock price drops on the ex-dividend day.

When dividends are compared to the stock price drop that occurs on the ex-dividend day, this fallacy is exposed. At that point in time, the investor has a choice between receiving the dividends or cashing out on the stock (and getting the higher price).

2. We have excess cash this year…

- Argument: The firm has excess cash on its hands this year, no investment projects this year and wants to give the money back to stockholders.
- Counter: So why not just repurchase stock? If this is a one-time phenomenon, the firm has to consider future financing needs. The cost of raising new financing in future years, especially by issuing new equity, can be staggering.

Excess cash might be a temporary phenomenon. To initiate dividends with the cash will create the expectation that the firm will continue to pay those dividends, which might be unsustainable.

Stock buybacks provide more flexibility in terms of future actions. An alternative is issue a special dividend.

The Cost of Raising Capital

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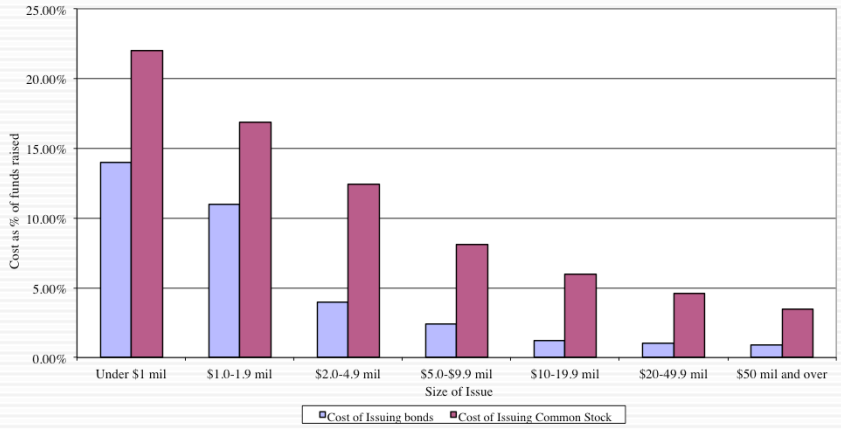
Figure 10.12: Issuance Costs for Stocks and Bonds



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If a small firm has excess cash and is uncertain about its future investment needs, it is prudent to hold the cash rather than return it to its stockholders.

Larger firms with more access to capital markets should be more inclined to use the cash to buy back stock.

Three "good" reasons for paying dividends…

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- Clientele Effect: The investors in your company like dividends.
- The Signalling Story: Dividends can be signals to the market that you believe that you have good cash flow prospects in the future.
- The Wealth Appropriation Story: Dividends are one way of transferring wealth from lenders to equity investors (this is good for equity investors but bad for lenders)

Given how many firms pay dividends, there must be good reasons for companies to start paying dividends, continue paying dividends or increase dividends.

1. The Clientele Effect
The "strange case" of Citizen's Utility

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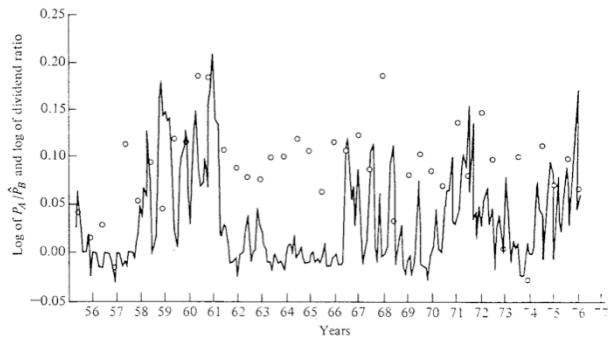

Class A shares pay cash dividend

Class B shares offer the same amount as a stock dividend & can be converted to class A shares

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To add: Class B shares can be converted into class A shares at any time. In effect, investors are being offered dividends or an equivalent capital gain.

Since the tax rate on dividends vastly exceeded the tax rate on capital gains over this period, you would expect the capital gains shares to trade at a premium.

When the ratio is greater than one, class A shares trade at a premium on class B shares. Over this period, class A shares consistently traded at a premium over class B shares, ranging from 5-15%.

Evidence from Canadian firms

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Company	Premium for cash dividend shares
Consolidated Bathurst	+ 19.30%
Donfasco	+ 13.30%
Dome Petroleum	+ 0.30%
Imperial Oil	+12.10%
Newfoundland Light & Power	+ 1.80%
Royal Trustco	+ 17.30%
Stelco	+ 2.70%
TransAlta	+1.10%
Average across companies	+ 7.54%

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The same phenomenon seems to apply to these Canadian utilities, with cash dividend and capital gain shares, that were studied in a paper a few years ago.

Here again, our conclusions should be restricted to stockholders holding this stock. For whatever reason, they prefer dividends to capital gains.

What type of stockholders do you think hold these companies?

Young or Old

Rich or Poor

Mutual Funds or Pension funds

Older, poorer investors and pension funds are big investors in high dividend paying stocks.

A clientele based explanation

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- Basis: Investors may form clienteles based upon their tax brackets. Investors in high tax brackets may invest in stocks which do not pay dividends and those in low tax brackets may invest in dividend paying stocks.
- Evidence: A study of 914 investors' portfolios was carried out to see if their portfolio positions were affected by their tax brackets. The study found that
  - (a) Older investors were more likely to hold high dividend stocks and
  - (b) Poorer investors tended to hold high dividend stocks

Investors buy stock in companies which have dividend policies that they like. This self-selection process creates dividend clienteles that each firm caters to. As long as there are sufficient investors in each clientele, having a high dividend or no dividend, by itself, should not affect value.

If an imbalance occurs between supply and demand in any clientele, there can be an effect on stock prices.

Results from Regression: Clientele Effect

$$\text{Dividend Yield}_t = a + b\,\beta_t + c\,\text{Age}_t + d\,\text{Income}_t + e\,\text{Differential Tax Rate}_t + \varepsilon_t$$

Variable	Coefficient	Implies
Constant	4.22%	
Beta Coefficient	-2.145	Higher beta stocks pay lower dividends.
Age/100	3.131	Firms with older investors pay higher dividends.
Income/1000	-3.726	Firms with wealthier investors pay lower dividends.
Differential Tax Rate	-2.849	If ordinary income is taxed at a higher rate than capital gains, the firm pays less dividends.

This is evidence of investors picking stocks based upon their tax status. Low income, older investors tend to buy safer stocks with higher dividends, and this behavior is accentuated when the difference in tax rates between dividends and capital gains increases.

Implication: The clientele effect has weakened in recent years, as the tax rates on dividends and capital gains have converged.

Dividend Policy and Clientele

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- Assume that you run a phone company, and that you have historically paid large dividends. You are now planning to enter the telecommunications and media markets. Which of the following paths are you most likely to follow?

a. Courageously announce to your stockholders that you plan to cut dividends and invest in the new markets.

b. Continue to pay the dividends that you used to, and defer investment in the new markets.

c. Continue to pay the dividends that you used to, make the investments in the new markets, and issue new stock to cover the shortfall

d. Other

Given that the dividend clientele that I have attracted is unlikely to be swayed by my arguments about my investment needs, I would try to spin off my media division and allow it to set a dividend policy very different from mine. In the spin off, investors who would prefer the capital gains will hold on to the media division shares and those who want the dividends will continue to hold the phone company shares.

Many phone companies have separately traded stocks for their wireless arms - one reason may be that the wireless business requires more risk, more growth and more reinvestment. and can afford to pay out less in dividends.

2. Dividends send a signal"
Increases in dividends are good news..

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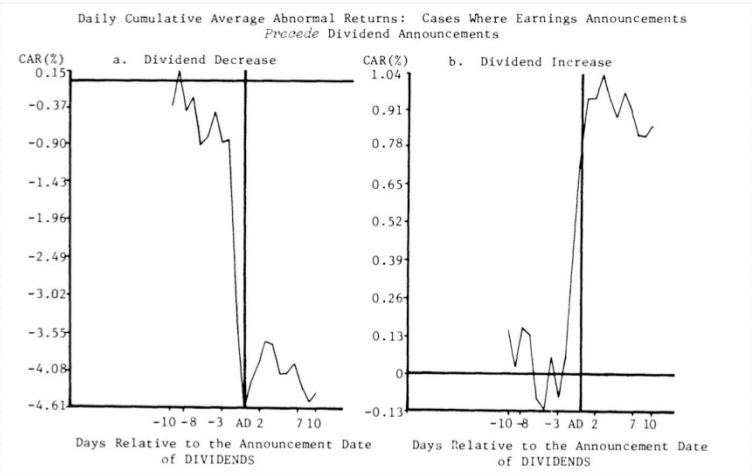
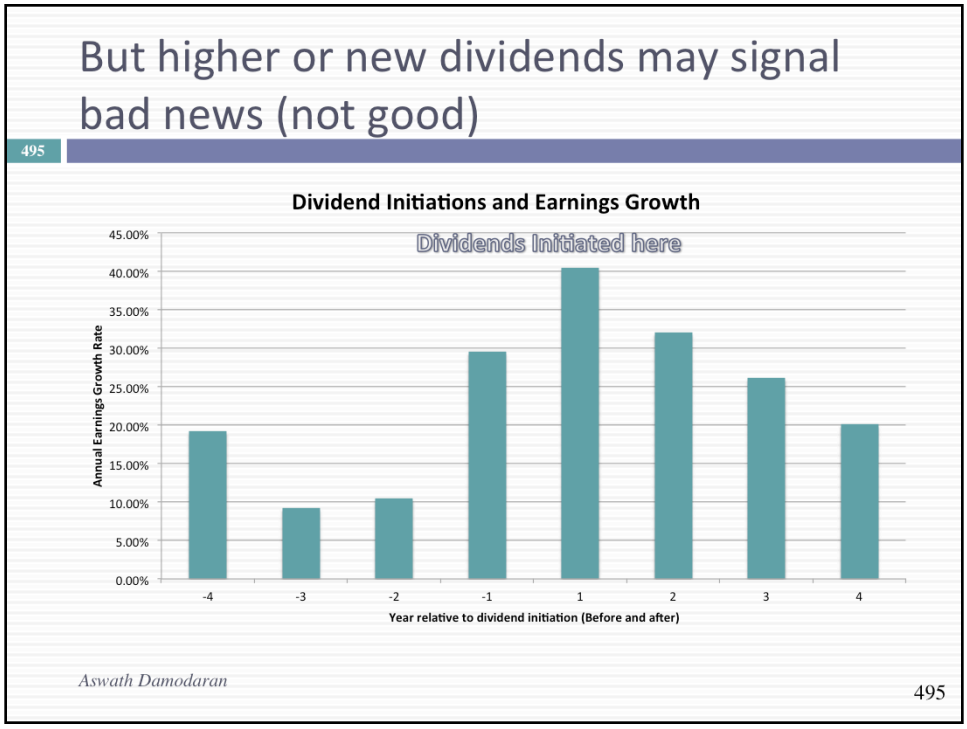
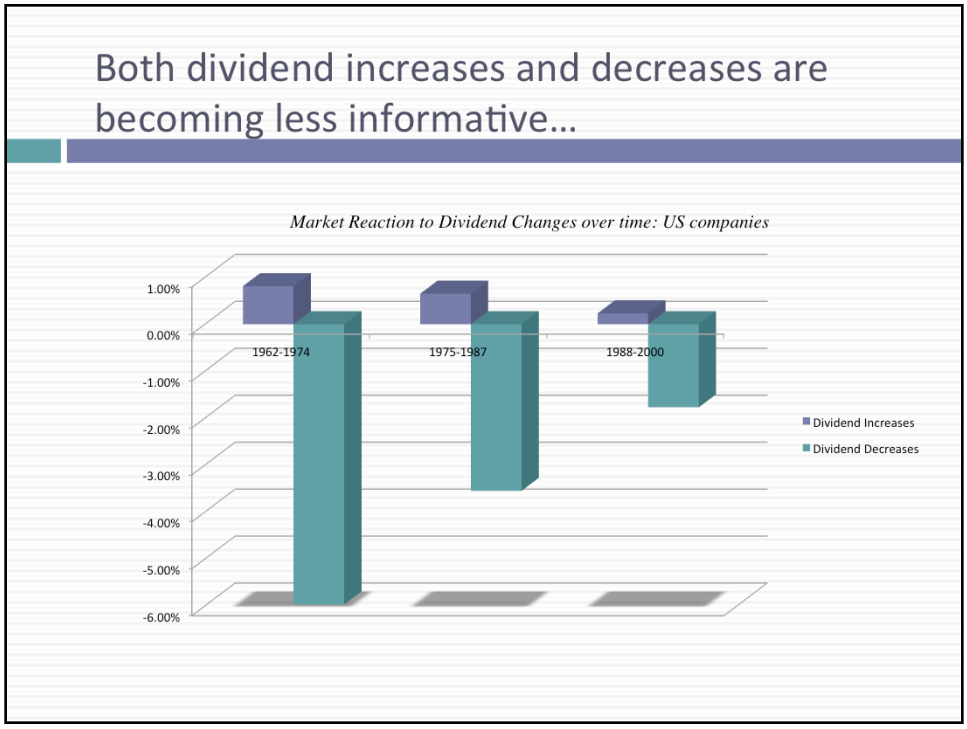


A firm which announces an increase in dividends is sending a signal that it expects future cash flows to be strong enough to sustain this dividend. This allows it to set itself apart from other firms, which might say they have great prospects but do not have the confidence in them to raise dividends.

Given how reluctant firms are to cut dividends, the act of cutting dividends is viewed by the market as a signal that the firm is in far worse trouble than they thought. (Note how much larger the stock price drop on a dividend decrease is than the stock price increase on a dividend increase.)

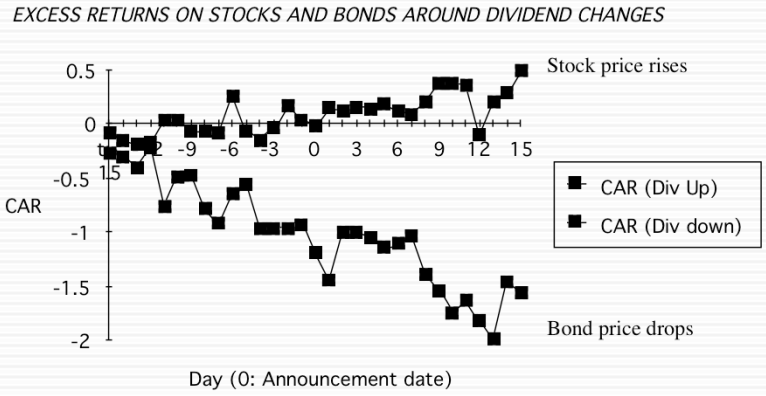


The flip side of the "dividends are good news" signal! A firm that increases or initiates dividends might be signaling that it is running out of investment opportunities. Note that earnings growth peaks around the period when dividends are initiated.



Over time, as companies have increasingly turned to using stock buybacks to return cash to stockholders, both dividend increases and decreases have become less informative… Investors care less (though they still care) than they used to about both.

3. Dividend increases may be good for stocks… but bad for bonds..



Bondholders view dividend increases as bad news. It makes the bonds much riskier. To the extent that the dividend increase was unanticipated and was not built into interest rate, this transfers wealth from bondholders to stockholders.

What managers believe about dividends…

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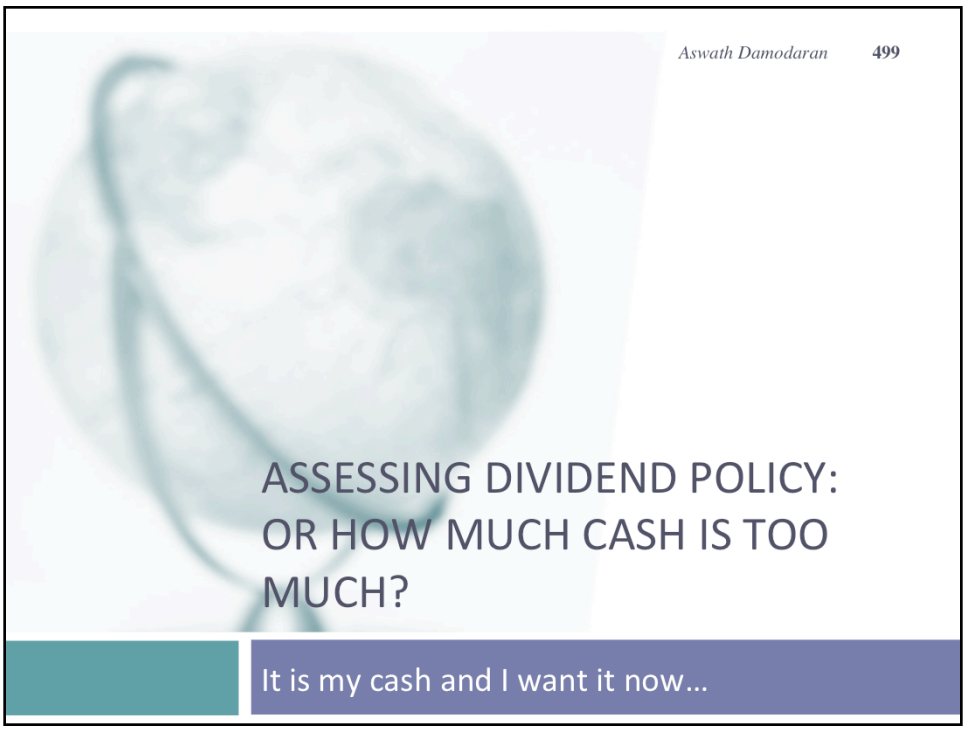
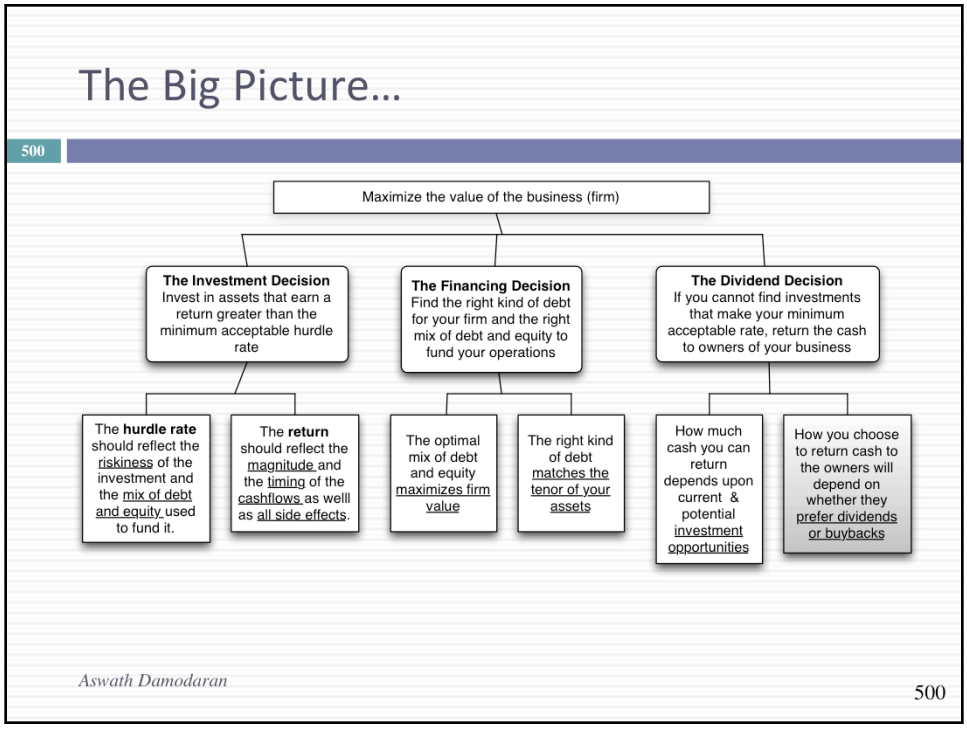
Statement of Management Beliefs	*Agree*	*No Opinion*	*Disagree*
1. A firm's dividend payout ratio affects the price of the stock.	61%	33%	6%
2. Dividend payments provide a signaling device of future prospects.	52%	41%	7%
3. The market uses divided announcements as information for assessing firm value.	43%	51%	6%
4. Investors have different perceptions of the relative riskiness of dividends and retained earnings.	56%	42%	2%
5. Investors are basically indifferent with regard to returns from dividends and capital gains.	6%	30%	64%
6. A stockholder is attracted to firms that have dividend policies appropriate to the stockholder's tax environment.	44%	49%	7%
7. Management should be responsive to shareholders' preferences regarding dividends.	41%	49%	10%

This survey was from 1985. In an updated and comprehensive survey of dividend policy published in 2004, Brav, Graham, Harvey, and Michaely conclude that management's focus is not on the level of dividends but on changes in these dividends. Indicating a shift from views in prior studies, many managers in this survey saw little gain from increasing dividends, even in response to higher earnings and preferred stock buybacks instead. In fact, many managers in companies that paid dividends regret the level of dividends paid by their firms, indicating that they would have set the dividend at a much lower level if they had the choice. In contrast to the survey quoted in the last paragraph, managers also rejected the idea that dividends operate as useful financial signals. From the survey, the authors conclude that the rules of the game for dividends are the following: do not cut dividends, have a dividend policy similar to your peer group, preserve a good credit rating, maintain flexibility, and do not take actions that reduce earnings per share. A. Brav, J. R. Graham, C. R. Harvey, and R. Michaely, 2004, "Payout Policy in the 21st Century," Working Paper, Duke University, Durham, NC.



A different way of framing the question: Can a company have too much cash or how much cash is too much cash?



If we can assess whether a company should be returning more or less in cash, it does not really matter whether it is in the form of dividends or stock buybacks.

Assessing Dividend Policy

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- Approach 1: The Cash/Trust Nexus
  - Assess how much cash a firm has available to pay in dividends, relative what it returns to stockholders. Evaluate whether you can trust the managers of the company as custodians of your cash.
- Approach 2: Peer Group Analysis
  - Pick a dividend policy for your company that makes it comparable to other firms in its peer group.

Two very different approaches to assessing dividend policy. The first is more comprehensive but the second is simpler.

I. The Cash/Trust Assessment

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Step 1: How much did the the company actually pay out during the period in question?

Step 2: How much could the company have paid out during the period under 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?

By paid out to stockholders in this phase of the analysis, we mean both dividends and stock buybacks.

How much has the company returned to stockholders?

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

	Disney		*Vale*		*Tata Motors*		*Baidu*		*Deutsche Bank*	
Year	Dividends	Buybacks	Dividends	Buybacks	Dividends	Buybacks	Dividends	Buybacks	Dividends	Buybacks
2008	$648	$648	$2,993	$741	7,595₹	0₹	¥0	¥0	2,274 €	0 €
2009	$653	$2,669	$2,771	$9	3,496₹	0₹	¥0	¥0	309 €	0 €
2010	$756	$4,993	$3,037	$1,930	10,195₹	0₹	¥0	¥0	465 €	0 €
2011	$1,076	$3,015	$9,062	$3,051	15,031₹	0₹	¥0	¥0	691 €	0 €
2012	$1,324	$4,087	$6,006	$0	15,088₹	970₹	¥0	¥0	689 €	0 €
2008-12	**$4,457**	**$15,412**	**$23,869**	**$5,731**	**51,405₹**	**970₹**	**¥0**	**¥0**	**¥4,428**	**¥0**

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Four of the companies paid dividends over the five-year period, but there are interesting differences between the companies. Disney, and Tata Motors increased dividends in each of the five years, but Vale had more volatile dividends over the period, with dividends dropping significantly in the most recent year. This reflects the convention of focusing on absolute dividends in the United States and India, but the practice of maintaining payout ratios in Brazil. Deutsche Bank had a precipitous drop in dividends since 2008, reflecting the effects of the market crisis and the desire to maintain regulatory capital ratios.

Looking at stock buybacks, Disney has been the most active player buying stock in all five years, with buybacks exceeding $15 billion over the period. Vale also had some stock buybacks but they were negligible in Tata Motors and Deutsche Bank.

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

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- 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
  = FCFE before net debt cash flow (Owner's Earnings)
  + New Debt Issues
  - Debt Repayments
  = FCFE after net debt cash flow

This cashflow is

Free: because it cashflow left over after debt payments and investment needs have been met

To Equity Investors: because it is after payments to all non-equity claimholders

In coming up with the numbers, we define

Capital expenditures as including all capital investments. We do not distinguish between discretionary and non-discretionary cap ex. Once we assume growth in earnings, all cap ex is non-discretionary.

Working capital needs refers to the increase in non-cash working capital.

Estimating FCFE when Leverage is Stable

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- The cash flow from debt (debt issue, netted out against repayment) can be a volatile number, creating big increases or decreases in FCFE, depending upon the period examined.
- To provide a more balanced measure, you can estimate a FCFE, assuming a stable debt ratio had been used to fund reinvestment over the period.

Net Income
- (1- Debt Ratio) (Capital Expenditures - Depreciation)
- (1- Debt Ratio) Working Capital Needs
= Free Cash flow to Equity
Debt Ratio = Debt/Capital Ratio (either an actual or a target)

When leverage is stable,

All principal repayments will come from new debt issues (since repaying them with equity will lower the debt ratio)

New external financing needs [Cap Ex - Depreciation + Change in non-cash working capital] have to be financed using the desired debt ratio

Adding the two together:

New Debt Issues = Principal Repayments + δ (Cap Ex - Depreciation + Change in Non-cash Working Capital)

Substituting back into the FCFE equation on the previous page in the case where there is no preferred dividend, we arrive at this formula. If there are preferred dividends, they will be subtracted out to get to the FCFE.

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).

The depreciation numbers also include amortization and the capital expenditures include cash acquisitions. Increases in noncash working capital, shown as positive numbers, represent a drain on the cash, whereas decreases in noncash working capital, shown as negative numbers, represent positive cash flows. In 2008, for example, noncash working capital decreased by $109 million, increasing the cash available for stockholders in that year by the same amount. Finally, the net cash flow from debt is the cash generated by the issuance of new debt, netted out against the cash outflow from the repayment of old debt. Again, using 2008 as an example, Disney repaid $235 more in old debt than it raised in new debt, and this represents a negative cash flow in that year. We have computed three measures of FCFE, one before the net debt cash flow, one after the actual net debt cash flow and one computed assuming that they had stuck with a target debt ratio of 40%. Using 2008 as an illustration, we compute each as follows:

$FCFE_{\text{Before Debt CF}}$= Net Income + Depreciation – Capital Expenditures – Change in Noncash Working Capital = 3307 -122 –(-109) = 3294

$FCFE_{\text{After Debt CF}}$= $FCFE_{\text{Before Debt CF}}$ + Net Debt CF = 3296 - 235 = 3059

FCFE target debt ratio = 3307 – (122-109) (1-.40) =3296

How companies get big cash balances: Microsoft in 1996…

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- Consider the following inputs for Microsoft in 1996.
  - Net Income = $2,176 Million
  - Capital Expenditures = $494 Million
  - Depreciation = $ 480 Million
  - Change in Non-Cash Working Capital = $ 35 Million
  - Debt = None

FCFE = Net Income - (Cap ex - Depr) – Change in non-cash WC – Debt CF

= $ 2,176 - (494 - 480) - $ 35 - 0 = $ 2,127 Million

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

Note that Microsoft has almost no net cap ex. That is because their biggest reinvestment expenditure is R&D, which is expensed to arrive at net income. This cash if not paid out will result in an increase in the cash balance for Microsoft of $2,127 million just in 1996. Each year that Microsoft did this, its cash balance increased further.

FCFE for a Bank?

- We redefine reinvestment as investment in regulatory capital.

$FCFE_{Bank}$ = Net Income – Increase in Regulatory Capital (Book Equity)

- Consider a bank with $ 10 billion in loans outstanding and book equity of $ 750 million. If it maintains its capital ratio of 7.5%, intends to grow its loan base by 10% (to $11 and expects to generate $ 150 million in net income:

FCFE = $150 million – (11,000-10,000)* (.075) = $75 million

Deutsche Bank: FCFE estimates (November 2013)

	Current	1	2	3	4	5
Risk Adjusted Assets (grows 3% each year)	439,851 €	453,047 €	466,638 €	480,637 €	495,056 €	509,908 €
Tier 1 as % of Risk Adj assets	15.13%	15.71%	16.28%	16.85%	17.43%	18.00%
Tier 1 Capital	66,561 €	71,156 €	75,967 €	81,002 €	86,271 €	91,783 €
Change in regulatory capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €
Book Equity	76,829 €	81,424 €	86,235 €	91,270 €	96,539 €	102,051 €
ROE (increases to 8%)	-1.08%	0.74%	2.55%	4.37%	6.18%	8.00%
Net Income	-716 €	602 €	2,203 €	3,988 €	5,971 €	8,164 €
- Investment in Regulatory Capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €
FCFE		-3,993 €	-2,608 €	-1,047 €	702 €	2,652 €

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We draw on the regulatory capital measure to estimate FCFE. Since it is difficult to estimate traditional cap ex and working capital for a bank, we look at additions to regulatory capital as the primary capital expenditure. Thus, conservative banks or banks that want to increase their capital ratio will tend to pay less dividends, as will growing banks.

See how much dividend you could pay, if you were willing to maintain a 6% capital ratio ($90 million) or if your growth were only 5% ($112.5 million).

For Deutsche Bank, we are assuming the following:

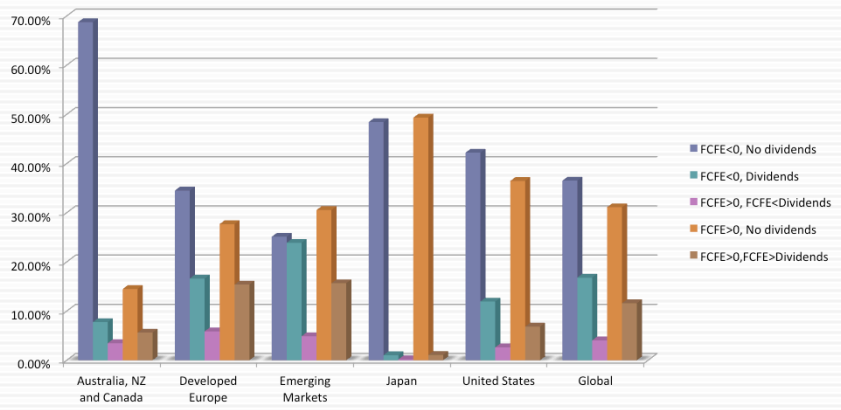
1. We begin with the current values for the asset base and regulatory capital at the end of 2012
2. 2. We assume that the expected growth in the asset base will be 3% a year for the next 5 years and 2% thereafter.

3. We assume a target Tier 1 regulatory capital ratio of 16% in year 5..

4. We assume that the return on equity from the current value of -1.08% to 8% in year 5 and beyond.

Dividends versus FCFE: Across the globe

Figure 11.2: Dividends versus FCFE in 2014



Many firms in 2013 seemed to be paying out more than they could afford to in dividends.

Cash Buildup and Investor Blowback: Chrysler in 1994

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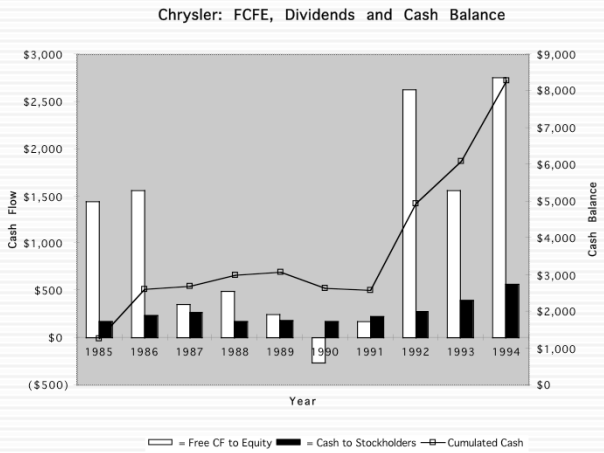

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This shows the accumulation of a large cash balance at Chrysler. Starting with a zero cash balance in 1985, I added back the difference between FCFE and dividends each year to the cash balance. In the last few years, that difference has led to an accumulation in cash.

This large cash balance, of course, was what triggered the attempt by Kirk Kirkorian to take over Chrysler. While he failed, he did put sufficient pressure on Chrysler to force them to increase dividends and buy back stock.

Note that while Chrysler has argued that it needs a large cash balance as a buffer against the next recession, it used up only $ 0.5 billion during the 1990-91 recession.

Application Test: Estimating your firm's FCFE

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In General,	If cash flow statement used
Net Income	Net Income
+ Depreciation & Amortization	+ Depreciation & Amortization
- Capital Expenditures	+ Capital Expenditures
- Change in Non-Cash Working Capital	+ Changes in Non-cash WC
- Preferred Dividend	+ Preferred Dividend
- Principal Repaid	+ Increase in LT Borrowing
+ New Debt Issued	+ Decrease in LT Borrowing
	+ Change in ST Borrowing
= FCFE	= FCFE
Compare to	
Dividends (Common)	Common Dividend
+ Stock Buybacks	Stock Buybacks

Estimate the firm's FCFE and compare to how much it returned to stockholders.

A Practical Framework for Analyzing Dividend Policy

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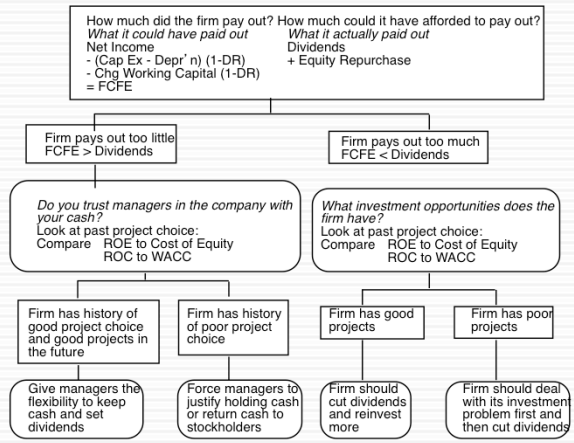

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Most firms return less in cash than they have available to return. Whether they will find themselves under pressure (like Chrysler) or relatively untouched (like Microsoft) will depend upon how much stockholders trust the managers of the firm to use the cash wisely.

Stockholders will tend to be less aggressive about demanding that the cash be returned to them for firms

1. With a good investment track record
2. In a sector with high returns
3. Where managers have substantial equity stakes in the firm

They will tend to be most aggressive when these conditions do not hold.

A Dividend Matrix

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Cash Returned, relative to Free Cash flow to Equity	Quality of projects taken: Excess Returns	
	Poor projects	Good projects
Cash Return < FCFE	*Cash Surplus + Poor Projects* Significant pressure to pay out more to stockholders as dividends or stock buybacks	*Cash Surplus + Good Projects* Maximum flexibility in setting dividend policy
Cash return > FCFE	*Cash Deficit + Poor Projects* Reduce or eliminate cash return but real problem is in investment policy.	*Cash Deficit + Good Projects* Reduce cash payout, if any, to stockholders

The freedom that a company will have with dividend policy is directly proportional to its history in delivering high returns both on projects and to its stockholders.

More on Microsoft

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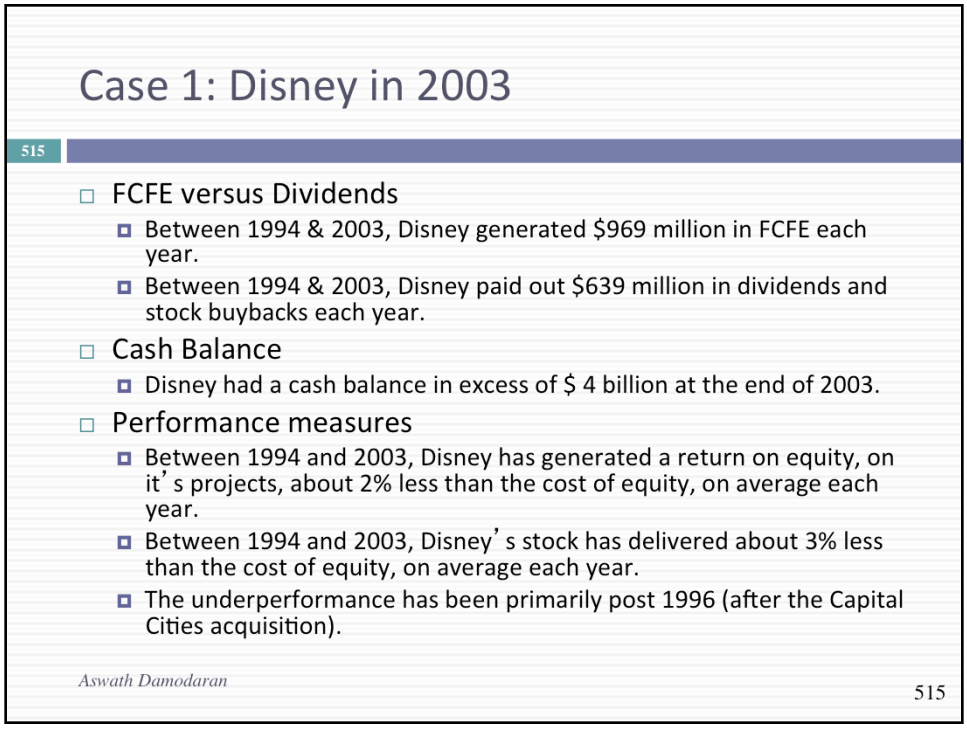
- Microsoft had accumulated a cash balance of $ 43 billion by 2002by paying out no dividends while generating huge FCFE. At the end of 2003, there was no evidence that Microsoft was being penalized for holding such a large cash balance or that stockholders were becoming restive about the cash balance. There was no hue and cry demanding more dividends or stock buybacks. Why?
- In 2004, Microsoft announced a huge special dividend of $ 33 billion and made clear that it would try to return more cash to stockholders in the future. What do you think changed?

During that period, Microsoft also generated extraordinary returns on the projects its took (ROE > cost of equity by more than 10%) and good returns for its stockholders (Jensen's alpha > 10%)…. Stockholders felt comfortable leaving their cash in the company. (The fact that Bill Gates and Steve Ballmer had substantial investments in the company was probably a contributing factor)

While the most obvious answer that comes to mind is the change in the dividend tax rate, there was a strong contributing factor. Microsoft's return on equity has been dropping in recent years and many of Microsoft's recent investments (in entertainment and software) have not paid off… The stock has not done much over the last two years. Microsoft may be anticipating stockholder pressure and being proactive.

Pstscript: Microsoft announced a $40 billion stock buyback in 2006



In 2003, the company was playing a weak hand, given a decade of bad performance.

Can you trust Disney's management?

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

The fact that Disney has underperformed the market both in terms of stock price performance and return on equity suggests that stockholders are unlikely to have much patience with Disney accumulating cash (afraid of what they will do with the cash). That conclusion is reinforced by the fact that the managers responsible for the damage are still at the helm of the firm.

The Bottom Line on Disney Dividends in 2003

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

Disney's acquisition of ABC is a huge gamble. By taking cash that has accumulated over time, and using this cash (in conjunction with new debt and equity issues) to finance a large acquisition, Disney has essentially puts its chips on the acquisition working out.

If it does not, stockholders will probably remember the acquisition and be much less likely to let Disney's managers accumulate cash again. (This is what happened in the aftermath of large failures like AT&T's acquisition of NCR and Kodak's acquisition of Sterling Drugs)

Following up: Disney in 2009

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

I would trust Disney's management more in 2008 than I did in 2003. I would probably agree that they should retain more cash, especially in light of last year's liquidity crisis, but it would not be a blank check. I would watch their new investments (say the acquisition of Marvel to see if they are continue to be deserving of my trust.

Final twist: Disney in 2013

- Disney did return to holding cash between 2008 and 2013, with dividends and buybacks amounting to $2.6 billion less than the FCFE (with a target debt ratio) over this period.
- Disney continues to earn a return on capital well in excess of the cost of capital and its stock has doubled over the last two years.
- Now, assume that Bob Iger asks you for permission to withhold even more cash to cover future investment needs. Are you likely to go along?

a. Yes

b. No

Disney continues to do well. That is the good news and will buy them some flexibility.

But Iger needs to mend fences and improve corporate governance.

Case 2: 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%	

Vale was clearly paying too much in dividends.

Vale: Its your call..

- Vale's managers have asked you for permission to cut dividends (to more manageable levels). Are you likely to go along?
  a. Yes
  b. No
- The reasons for Vale's dividend problem lie in it's equity structure. Like most Brazilian companies, Vale has two classes of shares - common shares with voting rights and preferred shares without voting rights. However, Vale has committed to paying out 35% of its earnings as dividends to the preferred stockholders. If they fail to meet this threshold, the preferred shares get voting rights. If you own the preferred shares, would your answer to the question above change?
  a. Yes
  b. No

Vale can make a reasonable case that they should be cutting dividends and reinvesting more back into the business… Whether their investors will accept this reasoning is a different issue. After all, preferred stockholders have not had voting rights and have received large dividends to compensate for the lack of control. At the minimum, I would demand voting rights in exchange for giving up dividends.

The broader lesson: Many emerging market companies have created multiple classes of shares, with different voting rights. The lower voting right shares are often compensated with a higher dividend. Sooner or later, these firms will be confronted by the conflict between their desire to maintain voting control and the need to have a sustainable dividend policy.

Mandated Dividend Payouts

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- Assume now that the government decides to mandate a minimum dividend payout for all companies. Given our discussion of FCFE, what types of companies will be hurt the most by such a mandate?
  a. Large companies making huge profits
  b. Small companies losing money
  c. High growth companies that are losing money
  d. High growth companies that are making money
- What if the government mandates a cap on the dividend payout ratio (and a requirement that all companies reinvest a portion of their profits)?

It will most hurt high growth companies that are making money, and thus will be mandated to pay out dividends, even though their FCFE is negative. Note that while earnings are positive, the net cap ex needed to sustain growth might make the FCFE a negative number.

Case 3: BP: Summary of Dividend Policy: 1982-1991

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	Summary of calculations			
	Average	*Standard Deviation*	*Maximum*	*Minimum*
Free CF to Equity	$571.10	$1,382.29	$3,764.00	($612.50)
Dividends	$1,496.30	$448.77	$2,112.00	$831.00
Dividends+Repurchases	$1,496.30	$448.77	$2,112.00	$831.00
Dividend Payout Ratio	84.77%			
Cash Paid as % of FCFE	262.00%			
ROE - Required return	-1.67%	11.49%	20.90%	-21.59%

BP clearly paid out more than it could have afforded to during this period. It financed the shortfall (in each year except 1987, when it issued stock) by borrowing money.

BP: Just Desserts!

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

By MATTHEW L. WALD

British Petroleum said yesterday that it would cut its dividend by 55 percent, take a pretax restructuring charge of $1.82 billion for the second quarter and lay off 11,500 employees, or 10 percent of its worldwide work force. The moves came five weeks after Robert B. Horton, B.P.'s chairman, resigned under pressure from the company's outside directors.

Analysts anticipated a dividend cut by the oil company, the world's third largest, but the one announced was at the low end of their expectations. In response, shares of the company's American depository rights, each of which represents 12 shares of the London-based company, dropped $3.625, or 7.36 percent, to $45.375. It was the most active issue on the New York Stock Exchange, with 5.89 million shares traded.

The Royal Dutch/Shell group also reported a disappointing quarter yesterday, with earnings on a replacement cost basis — excluding gains or losses on inventory holdings — of $966 million, down 22 percent.

Quick Recovery Seems Unlikely

Adding to the gloom at B.P., the new chief executive, David A. G. Simon, said the prospects for a quick recovery were poor. "External trading conditions are expected to remain difficult, particularly for the downstream oil and chemicals businesses, with growth prospects for the world's economies remaining uncertain," he said in a statement. Downstream oil is an industry term for refining and marketing operations, as distinct from oil production.

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

The crude oil market, he predicted, would remain balanced unless Iraqi oil was allowed to re-enter the market. The company said it was well positioned to take advantage of any

The giant British oil company bet on rising oil prices.

increase in oil prices, but the company's oil production in the United States is declining. B.P. is the largest producer in Alaska.

The market for petrochemicals in Europe remains weak.

B.P.'s second quarter profits, before one-time transactions, declined to $193 million from $515 million, valuing inventories on a replacement-cost basis. James J. Murchie, an analyst at Stanford C. Bernstein, estimated that after exceptional items, earnings per share fell to 30 cents in the second quarter, compared with 62 cents a year earlier.

Analysts attributed B.P.'s problems to the company's acquisitions in the last few years, and heavy capital expenditures. Summing up the company's recent history, Frank P. Kneuttel of Prudential Securities Research said, "Debt rose, interest expense rose, and profits have gone to hell."

Mr. Murchie, who worked for Standard Oil of Ohio and then B.P. after B.P. acquired Sohio, said, "What you've got is a company that thought oil prices were going to go to $25 and spent like it, in terms of capital." If B.P.'s costs of finding oil are the same as the industry average, he said, then the company has been spending enough to replace 120 percent to 130 percent of its annual production, which is not a successful strategy if prices do not rise.

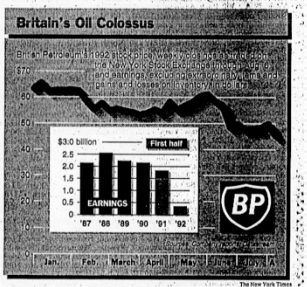
In addition, he said, the company had been spending twice as much on its refining and marketing operation as it was recording in depreciation.

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

The analyst said that while some of the cuts were obvious, "some came

Continued on Page D2

Britain's Oil Colossus



The New York Times

While it is pretty clear the BP should cut dividends, the stock price response was not positive when it did. This reflects the fact that investor clienteles cannot be changed overnight. In BP's case, its history of high dividends had attracted investors who liked the high dividends. When they cut the dividends, these investors sold and a new clientele moved in, but not immediately. (It took a few months)

In hindsight, by cutting dividends, BP became a much healthier firm, with higher returns and lower leverage, after the dividend cut.

Managing changes in dividend policy

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Category	Periods Around Announcement Date		
	Prior Quarter	*Announcement Period*	*Quarter After*
Simultaneous announcement of earnings decline/loss (N = 176)	–7.23%	–8.17%	+1.80%
Prior announcement of earnings decline or loss (N = 208)	–7.58%	–5.52%	+1.07%
Simultaneous announcement of investment or growth opportunities (N = 16)	–7.69%	–5.16%	+8.79%

There are several lessons for a firm that plans to change its dividend policy. First, no matter how good the rationale may be to cut dividends, it should expect markets to react negatively to the initial announcement for two reasons. The first reason is the well-founded skepticism with which markets greet any statement by the firm about dividend cuts. A second is that large dividend changes typically make the existing investor clientele unhappy. Although other stockholders may be happy with the new dividend policy, the transition will take time, during which stock prices fall. Second, if a firm has good reasons for cutting dividends, such as an increase in project availability, it will gain at least partial protection by providing information to markets about these projects.

Case 4: The Limited: Summary of Dividend Policy: 1983-1992

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Summary of calculations				
	Average	*Standard Deviation*	*Maximum*	*Minimum*
Free CF to Equity	($34.20)	$109.74	$96.89	($242.17)
Dividends	$40.87	$32.79	$101.36	$5.97
Dividends+Repurchases	$40.87	$32.79	$101.36	$5.97
Dividend Payout Ratio	18.59%			
Cash Paid as % of FCFE	-119.52%			
ROE - Required return	1.69%	19.07%	29.26%	-19.84%

A firm with negative FCFE should not pay dividends, especially when its projects earn excess returns.

Growth Firms and Dividends

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- High growth firms are sometimes advised to initiate dividends because its increases the potential stockholder base for the company (since there are some investors - like pension funds - that cannot buy stocks that do not pay dividends) and, by extension, the stock price. Do you agree with this argument?
  a. Yes
  b. No
- Why?

No. For every investor that these firms gain because they pay dividends, they lose more investors who will not buy the stock any more because the firm pays dividends.

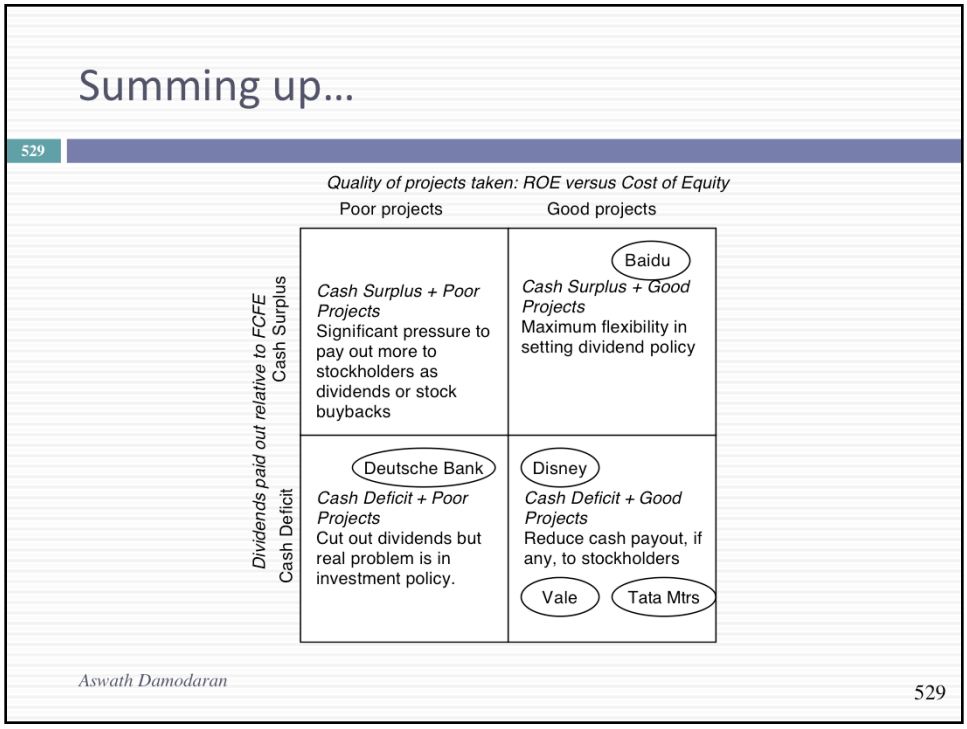
Besides, firms which cannot afford to pay dividends should not be attracting a clientele that wants and likes dividends.

5. Tata Motors

	Aggregate	Average
Net Income	$421,338.00	$42,133.80
Dividends	$74,214.00	$7,421.40
Dividend Payout Ratio	17.61%	15.09%
Stock Buybacks	$970.00	$97.00
Dividends + Buybacks	$75,184.00	$7,518.40
Cash Payout Ratio	17.84%	
Free CF to Equity (pre-debt)	($106,871.00)	($10,687.10)
Free CF to Equity (actual debt)	$825,262.00	$82,526.20
Free CF to Equity (target debt ratio)	$47,796.36	$4,779.64
Cash payout as % of pre-debt FCFE	FCFE negative	
Cash payout as % of actual FCFE	9.11%	
Cash payout as % of target FCFE	157.30%	

Negative FCFE, largely because of acquisitions.

Tata Motors is paying out too much, relative to its actual FCFE and the only reason that it is able to pay dividends is because of its access to debt. Looks like the Tata Group is subsidizing dividend payments to Tata Motors stockholders.



Summarizes the discussion from the last few pages… with a few examples as of 2013

Baidu is accumulating cash but is likely to be cut some slack both because of its growth status and because it has done well for its investors….

Deutsche Bank is paying too much in dividends, but its poor investment choices leave investors in a bad position.

Disney, Vale and Tata Motors all return too much cash but the damage that this is creating likely varies across the companies. Disney has excess debt capacity and can afford to pay out more than it can afford to and make up the difference by issuing debt. Vale is fairly levered and may be digging a hole for itself. Tata Motors is over levered and its dividend policy will only make things worse.

Application Test: Assessing your firm's dividend policy

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- Compare your firm's dividends to its FCFE, looking at the last 5 years of information.
- Based upon your earlier analysis of your firm's project choices, would you encourage the firm to return more cash or less cash to its owners?
- If you would encourage it to return more cash, what form should it take (dividends versus stock buybacks)?

Customize a solution for your firm's dividend policy… but think about your earlier analysis of its capital structure as well.

II. The Peer Group Approach

- In the peer group approach, you compare your company to similar companies (usually in the same market and sector) to assess whether and if yes, how much to pay in dividends.

	Dividend Yield		Dividend Payout				
Company	*2013*	*Average 2008-12*	*2013*	*Average 2008-12*	*Comparable Group*	*Dividend Yield*	*Dividend Payout*
Disney	1.09%	1.17%	21.58%	17.11%	US Entertainment	0.96%	22.51%
Vale	6.56%	4.01%	113.45%	37.69%	Global Diversified Mining & Iron Ore (Market cap> $1 b)	3.07%	316.32%
Tata Motors	1.31%	1.82%	16.09%	15.53%	Global Autos (Market Cap> $1 b)	2.13%	27.00%
Baidu	0.00%	0.00%	0.00%	0.00%	Global Online Advertising	0.09%	8.66%
Deutsche Bank	1.96%	3.14%	362.63%	37.39%	European Banks	1.96%	79.32%

All of the companies looks surprisingly similar to their peer groups. (Actually, not so surprising).

A closer look at Disney's peer group

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Company	Market Cap	Dividends	Dividends + Buybacks	Net Income	FCFE	Dividend Yield	Dividend Payout	Cash Return/FCFE
The Walt Disney Company	$134,256	$1,324	$5,411	$6,136	$1,503	0.99%	21.58%	360.01%
Twenty-First Century Fox, Inc.	$79,796	$415	$2,477	$7,097	$2,408	0.52%	6.78%	102.87%
Time Warner Inc	$63,077	$1,060	$4,939	$3,019	-$4,729	1.68%	27.08%	NA
Viacom, Inc.	$38,974	$555	$5,219	$2,395	-$2,219	1.42%	23.17%	NA
The Madison Square Garden Co.	$4,426	$0	$0	$142	-$119	0.00%	0.00%	NA
Lions Gate Entertainment Corp	$4,367	$0	$0	$232	-$697	0.00%	0.00%	NA
Live Nation Entertainment, Inc	$3,894	$0	$0	-$163	$288	0.00%	NA	0.00%
Cinemark Holdings Inc	$3,844	$101	$101	$169	-$180	2.64%	63.04%	NA
MGM Holdings Inc	$3,673	$0	$59	$129	$536	0.00%	0.00%	11.00%
Regal Entertainment Group	$3,013	$132	$132	$145	-$18	4.39%	77.31%	NA
DreamWorks Animation SKG Inc.	$2,975	$0	$34	-$36	-$572	0.00%	NA	NA
AMC Entertainment Holdings	$2,001	$0	$0	$63	-$52	0.00%	0.00%	NA
World Wrestling Entertainment	$1,245	$36	$36	$31	-$27	2.88%	317.70%	NA
SFX Entertainment Inc.	$1,047	$0	$0	-$16	-$137	0.00%	NA	NA
Carmike Cinemas Inc.	$642	$0	$0	$96	$64	0.00%	0.00%	0.27%
Rentrak Corporation	$454	$0	$0	-$23	-$13	0.00%	NA	NA
Reading International, Inc.	$177	$0	$0	-$1	$15	0.00%	0.00%	0.00%
Average	**$20,462**	**$213**	**$1,083**	**$1,142**	**-$232**	**0.85%**	**41.28%**	**79.02%**
Median	**$3,673**	**$0**	**$34**	**$129**	**-$27**	**0.00%**	**6.78%**	**5.63%**

Aswath Damodaran

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Of the seventeen companies in this group, only seven paid dividends and six firms bought back stock. Rather than compare to the average or median for the entire sector, which is skewed by the non-dividend payers, we compared Disney to three of the other largest market-cap companies (Twenty-First Century Fox, Time Warner and Viacom) and there are similarities. Not only do they all pay dividends, with yields ranging from 0.52% to 4.39%, but many returned more cash than they had available to pay out (as FCFE).

Going beyond averages… Looking at the market

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- Regressing dividend yield and payout against expected growth across all US companies in January 2014 yields:

PYT = 0.649 – 0.296 (BETA) -.800 (EGR) + .300 (DCAP) R^2 = 19.6%
(32.16) (15.40) (8.90) (7.33)

YLD = 0.0324 – .0154 (BETA) -.038 (EGR) + .023 (DCAP) R^2 = 25.8%
(38.81) (19.41) (13.25) (13.45)

PYT = Dividend Payout Ratio = Dividends/Net Income
YLD = Dividend Yield = Dividends/Current Price
BETA = Beta (Regression or Bottom up) for company
EGR = Expected growth rate in earnings over next 5 years (analyst estimates)
DCAP = Total Debt / (Total Debt + Market Value of equity)

T statistics are in brackets. While the R-squared is unimpressive, the t statistics are all significant. Thus, we will use the regression with the recognition that predicted values will be noisy.

Higher growth companies tend to pay lower dividends. These simple regressions allow us to adjust payout ratios and yields for differences across US companies.

Using the market regression on Disney

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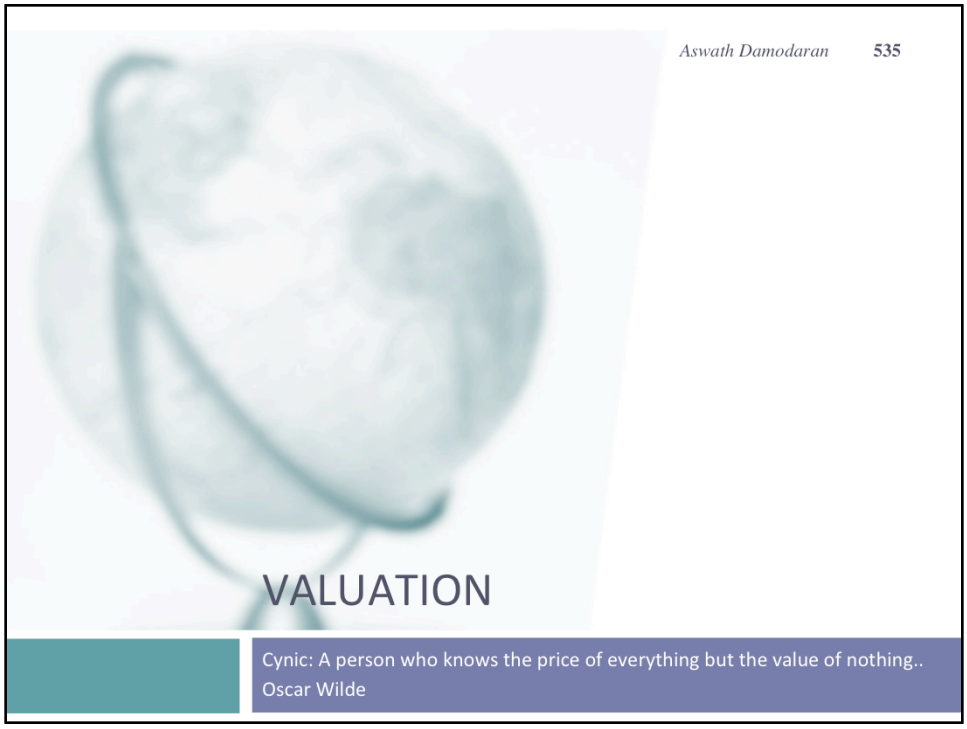
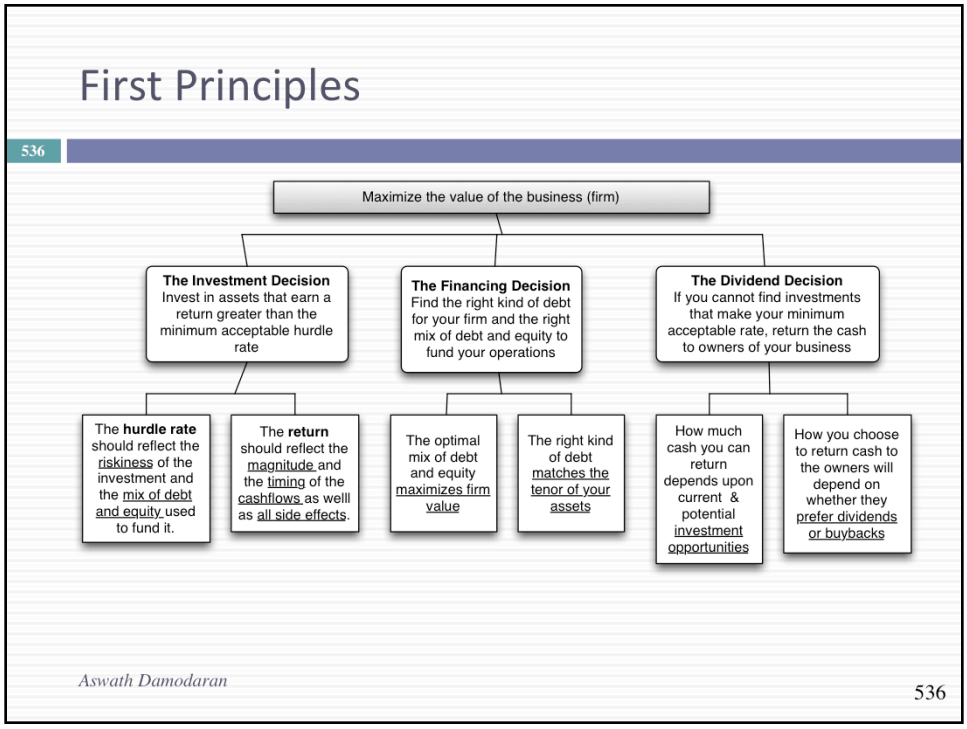
- To illustrate the applicability of the market regression in analyzing the dividend policy of Disney, we estimate the values of the independent variables in the regressions for the firm.
  - Beta for Disney (bottom up) = 1.00
  - Disney's expected growth in earnings per share = 14.73% (analyst estimate)
  - Disney's market debt to capital ratio = 11.58%
- Substituting into the regression equations for the dividend payout ratio and dividend yield, we estimate a predicted payout ratio:
  - Predicted Payout = .649 – 0.296 (1.00)-.800 (.1473) + .300 (.1158) = .2695
  - Predicted Yield = 0.0324 – .0154 (1.00)-.038 (.1473) + .023 (.1158) = .0140
- Based on this analysis, Disney with its dividend yield of 1.09% and a payout ratio of approximately 21.58% is paying too little in dividends. This analysis, however, fails to factor in the huge stock buybacks made by Disney over the last few years.

Two things to note:

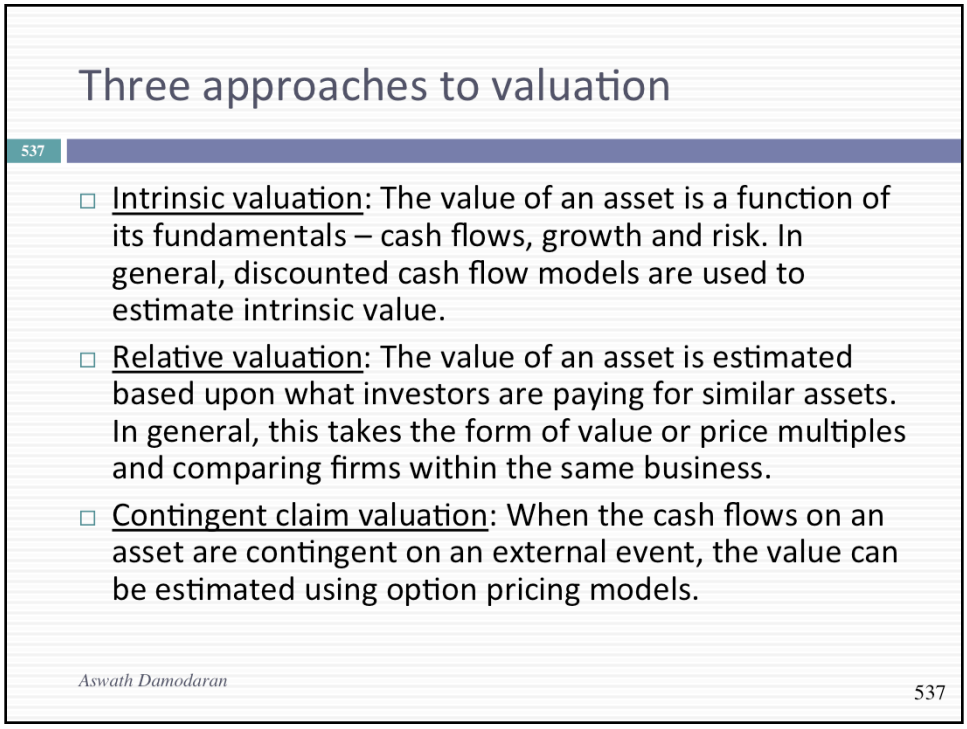
1. The low R-squared on the regressions will create large prediction ranges. Disney may very well be paying out too little in dividends, but there is enough noise in the predictions that you may not be willing to make that judgment.
2. We are assuming linear relationships between each of the independent variables and the dividend measures.



If corporate finance is all about maximizing value, you do have to know how to estimate value.

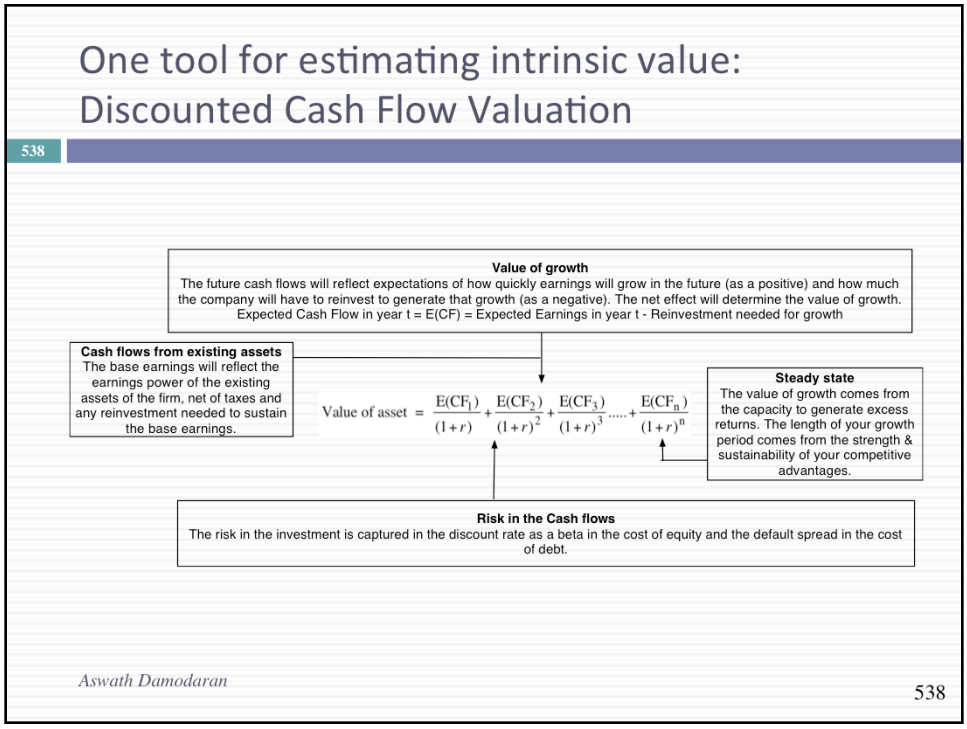


Back, full circle to the objective.



While there are hundreds of valuation models in practice, they will all fall into one of these three categories. There are some who argue that liquidation value is a fourth approach, but we estimate the values of assets in liquidation using either discounted cash flow or relative valuation models.

Intrinsic value and relative value will converge in efficient markets, but can diverge in inefficient markets. One way to frame how companies approach corporate finance is in terms of whether they focus on maximizing intrinsic value or relative value.



In discounted cash flow, the value of any asset is the present value of the expected cash flows on the assets. The discount rate becomes the vehicle for considering risks and the cash flow is an expectation across all possible outcomes.

Note: There is a misconception that computing the expected cash flow across multiple scenarios is somehow risk adjusting the cash flow. It is not.

Equity Valuation

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- The value of equity is obtained by discounting expected cashflows to equity, i.e., the residual cashflows after meeting all expenses, tax obligations and interest and principal payments, at the cost of equity, i.e., the rate of return required by equity investors in the firm.

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

where,

CF to Equity $_t$ = Expected Cashflow to Equity in period t

ke = Cost of Equity

- The dividend discount model is a specialized case of equity valuation, and the value of a stock is the present value of expected future dividends.

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The value of equity is the present value of cash flows to the equity investors discounted back at the rate of return that those equity investors need to make to break even (the cost of equity).

In the strictest sense of the word, the only cash flow stockholders in a publicly traded firm get from their investment is dividends, and the dividend discount model is the simplest and most direct version of an equity valuation model.

Firm Valuation

- The value of the firm is obtained by discounting expected cashflows to the firm, i.e., the residual cashflows after meeting all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions.

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

where,

CF to Firm $_t$ = Expected Cashflow to Firm in period t

WACC = Weighted Average Cost of Capital

A firm includes not just the equity, but all claim holders. The cash flow to the firm is the collective cash flow that all claim holders make from the firm, and it is discounted at the weighted average of their different costs.

Choosing a Cash Flow to Discount

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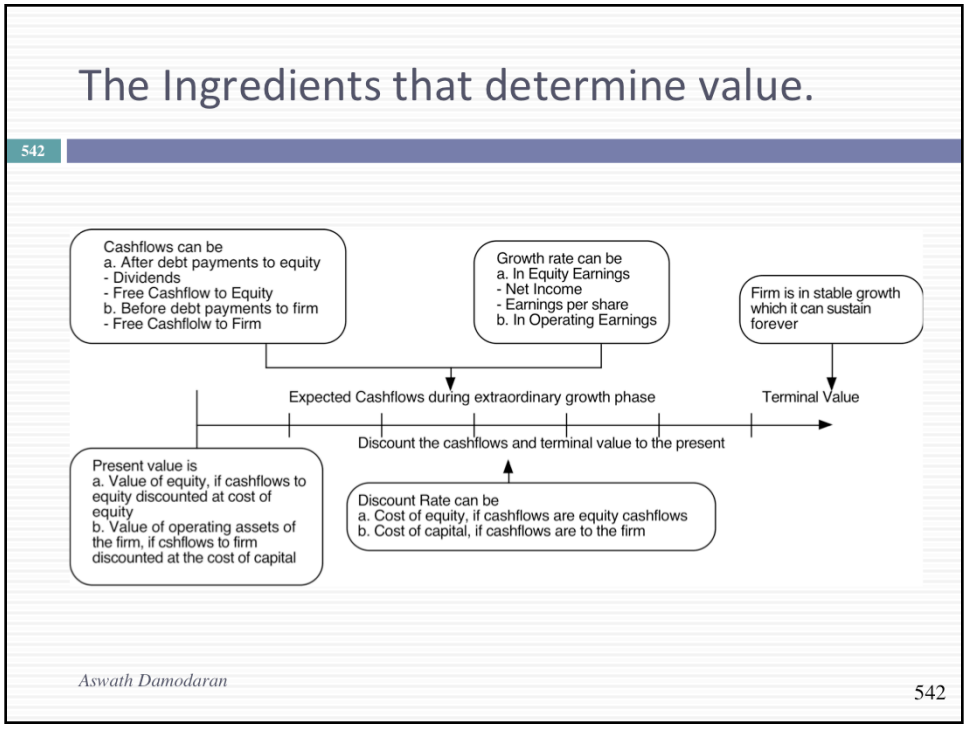
- When you cannot estimate the free cash flows to equity or the firm, the only cash flow that you can discount is dividends. For financial service firms, it is difficult to estimate free cash flows. For Deutsche Bank, we will be discounting dividends.
- If a firm's debt ratio is not expected to change over time, the free cash flows to equity can be discounted to yield the value of equity. For Tata Motors, we will discount free cash flows to equity.
- If a firm's debt ratio might change over time, free cash flows to equity become cumbersome to estimate. Here, we would discount free cash flows to the firm. For Vale and Disney, we will discount the free cash flow to the firm.

As a general rule, we should use a free cash flow (rather than a dividend) to discount, if we can estimate the free cash flow. It is difficult to estimate cap ex and working capital for a financial service firm.

When leverage is changing, we need to forecast debt repayments and new debt issues to estimate the free cash flow to equity. The free cash flow to the firm can be estimated much more directly.

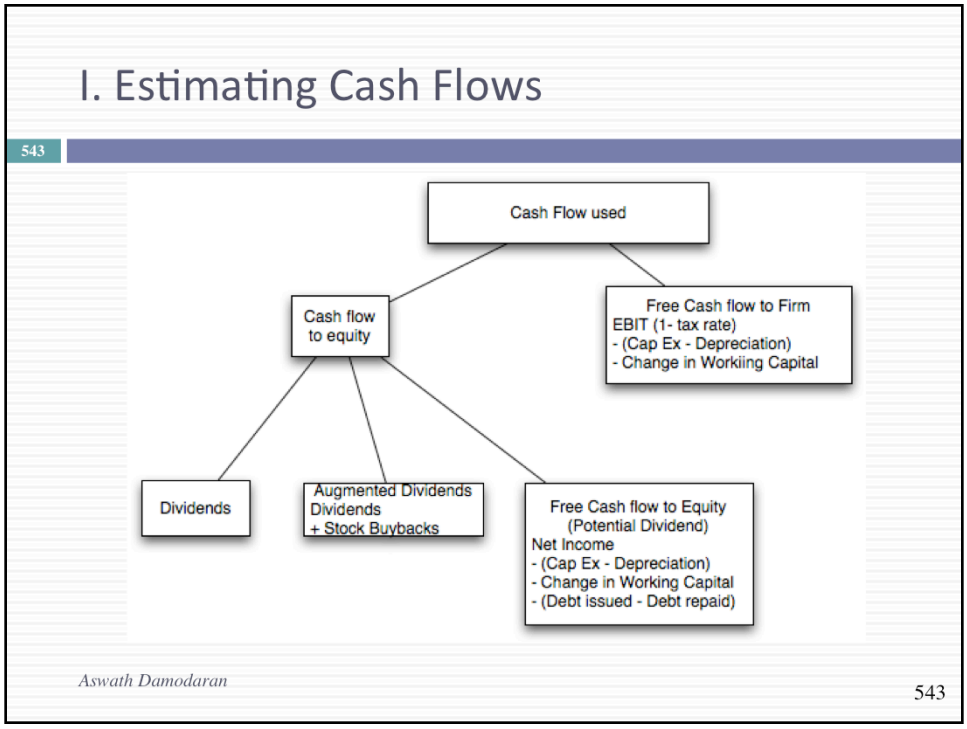


Sets up the basic inputs:

1. Discount rates
2. Cash flows
3. Expected Growth
4. Length of the period that they can sustain a growth rate higher than the growth rate of the economy.

How we estimate each of these numbers depends on whether we are taking an equity perspective or a firm perspective.

The answer to the fourth question matters because we cannot estimate cash flows forever and a publicly traded company, at least in theory, can last forever. If cash flows grow at the same rate forever, we can short circuit the cash flow estimation and compute the present value of all cash flows beyond that point in time with one equation (CF/ (r-g)).



Shows the different cash flows that can be used in valuation.

In equity valuation,

-The simplest and most direct measure of cash flow is dividends paid (Implicitly we are assuming that companies pay out their residual cash flows as dividends)

-A slightly modified approach is to add stock buybacks to dividends. Since buybacks tend to be lumpy, you may need to average buybacks over time.

-FCFE: You estimate the residual cash flow, after every conceivable need has been met. Again, there can be volatility in the reinvestment numbers that may need to be normalized.

In firm valuation, you are computing the cash flow to all claim holders in the firm. In effect, you are computing the cash flow before debt payments. That is why we start with operating income (EBIT) and act like we pay taxes on the EBIT. In effect, we ignore any tax benefits from interest expenses, since those will be captured in the cost of capital (through the use of an after-tax cost of debt)

Cap Ex includes acquisitions and the effect of R&D. (R&D is capitalized)

Dividends and Modified Dividends for Deutsche Bank

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- In 2007, Deutsche Bank paid out dividends of 2,146 million Euros on net income of 6,510 million Euros. In early 2008, we valued Deutsche Bank using the dividends it paid in 2007. In my 2008 valuation I am assuming the dividends are not only reasonable but sustainable.
- In November 2013, Deutsche Bank's dividend policy was in flux. Not only did it report losses but it was on a pathway to increase its regulatory capital ratio. Rather than focus on the dividends (which were small), we estimated the potential dividends (by estimating the free cash flows to equity after investments in regulatory capital)

	Current	2014	2015	2016	2017	2018	Steady state
Asset Base	439,851 €	453,047 €	466,638 €	480,637 €	495,056 €	509,908 €	517,556 €
Capital ratio	15.13%	15.71%	16.28%	16.85%	17.43%	18.00%	18.00%
Tier 1 Capital	66,561 €	71,156 €	75,967 €	81,002 €	86,271 €	91,783 €	93,160 €
Change in regulatory capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €	1,377 €
Book Equity	76,829 €	81,424 €	86,235 €	91,270 €	96,539 €	102,051 €	103,605 €
ROE	-1.08%	0.74%	2.55%	4.37%	6.18%	8.00%	8.00%
Net Income	-716 €	602 €	2,203 €	3,988 €	5,971 €	8,164 €	8,287 €
- Investment in Regulatory Capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €	1,554 €
FCFE		-3,993 €	-2,608 €	-1,047 €	702 €	2,652 €	6,733 €

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Dividends may be the most tangible and observable of all cash flows, but we are implicitly assuming that firms are paying out what they can afford to in dividends. While this may be reasonable for mature firms in stable economies, the assumption can break down (even for these firms). Deutsche Bank is a classic example.

In early 2008, most analysts would have considered Deutsche Bank (with its large size, diversified asset base and long history) to be in steady state and valued it by taking the dividends it paid in 2007 and building on those dividends. The banking crisis of 2008 should have led to a reassessment of that assumption.

Estimating FCFE (past) : Tata Motors

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Year	Net Income	Cap Ex	Depreciation	Change in WC	Change in Debt	Equity Reinvestment	Equity Reinvestment Rate
2008-09	-25,053₹	99,708₹	25,072₹	13,441₹	25,789₹	62,288₹	-248.63%
2009-10	29,151₹	84,754₹	39,602₹	-26,009₹	5,605₹	13,538₹	46.44%
2010-11	92,736₹	81,240₹	46,510₹	50,484₹	24,951₹	60,263₹	64.98%
2011-12	135,165₹	138,756₹	56,209₹	22,801₹	30,846₹	74,502₹	55.12%
2012-13	98,926₹	187,570₹	75,648₹	680₹	32,970₹	79,632₹	80.50%
Aggregate	330,925₹	592,028₹	243,041₹	61,397₹	120,160₹	290,224₹	**87.70%**

Like most firms, Tata Motors has volatile capital expenditures and its usage of debt varies widely over time. In making our projections, we will also look at averages over time.

Estimating FCFF: Disney

- In the fiscal year ended September 2013, Disney reported the following:
  - Operating income (adjusted for leases) = $10,032 million
  - Effective tax rate = 31.02%
  - Capital Expenditures (including acquisitions) = $5,239 million
  - Depreciation & Amortization = $2,192 million
  - Change in non-cash working capital = $103 million
- The free cash flow to the firm can be computed as follows:

After-tax Operating Income	= 10,032 (1 -.3102)	= $6,920
- Net Cap Expenditures	= $5,239 - $2,192	= $3,629
- Change in Working Capital	=	=$103
= Free Cashflow to Firm (FCFF)	=	= $3,188

- The reinvestment and reinvestment rate are as follows:
  - Reinvestment = $3,629 + $103 = $3,732 million
  - Reinvestment Rate = $3,732/ $6,920 = 53.93%

We include acquisitions made during 2013 in capital expenditures, but this is a volatile item. We also used the numbers that we obtained after adjusting for leases (as financial expenses rather than operating expenses).

II. Discount Rates

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- Critical ingredient in discounted cashflow valuation. Errors in estimating the discount rate or mismatching cashflows and discount rates can lead to serious errors in valuation.
- At an intuitive level, the discount rate used should be consistent with both the riskiness and the type of cashflow being discounted.
- The cost of equity is the rate at which we discount cash flows to equity (dividends or free cash flows to equity). The cost of capital is the rate at which we discount free cash flows to the firm.

Recaps what we stated when we talked about investment analysis.

Cost of Equity: Deutsche Bank 2008 versus 2013

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- In early 2008, we estimated a beta of 1.162 for Deutsche Bank, which used in conjunction with the Euro risk-free rate of 4% (in January 2008) and an equity risk premium of 4.50%, yielded a cost of equity of 9.23%.

  Cost of Equity $_{\text{Jan 2008}}$ = Riskfree Rate $_{\text{Jan 2008}}$ + Beta* Mature Market Risk Premium

  = 4.00% + 1.162 (4.5%) = 9.23%

- In November 2013, the Euro riskfree rate had dropped to 1.75% and the Deutsche's equity risk premium had risen to 6.12%:

  Cost of equity $_{\text{Nov '13}}$ = Riskfree Rate $_{\text{Nov '13}}$ + Beta (ERP)

  = 1.75% + 1.1516 (6.12%) = 8.80%

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The cost of equity can change over time, even if the beta for a firm does not change. In this case, the increase in the equity risk premium is pushing up the cost of equity. Even if the dividends were not expected to change, the value of equity in Deutsche will go down.

Cost of Equity: Tata Motors

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- We will be valuing Tata Motors in rupee terms. That is a choice. Any company can be valued in any currency.
- Earlier, we estimated a levered beta for equity of 1.1007 for Tata Motor's operating assets . Since we will be discounting FCFE with the income from cash included in the cash, we recomputed a beta for Tata Motors as a company (with cash):

  Levered $\text{Beta}_{\text{Company}}$= 1.1007 (1428/1630)+ 0 (202/1630) = 0.964
- With a nominal rupee risk-free rate of 6.57 percent and an equity risk premium of 7.19% for Tata Motors, we arrive at a cost of equity of 13.50%.

  Cost of Equity = 6.57% + 0.964 (7.19%) = 13.50%

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Currency is a choice. While it is usually easiest to get financial information in the local currency, there may be times when you choose to value a company in a different currency. Thus, if getting a riskfree rate in the local currency is difficult to do, you may decide to value a company in dollars or Euros.

Since we are discounting FCFE with the income from cash included in the cash flows, we adjust the beta (zero) for Tata Motor's cash balance (202 billion Rs). If we had planned to discount the FCFE from just the operating assets, we would have used the equity beta of just the operating assets in this valuation.

Current Cost of Capital: Disney

- The beta for Disney's stock in November 2013 was 1.0013. The T. bond rate at that time was 2.75%. Using an estimated equity risk premium of 5.76%, we estimated the cost of equity for Disney to be 8.52%:

  Cost of Equity = 2.75% + 1.0013(5.76%) = 8.52%

- Disney's bond rating in May 2009 was A, and based on this rating, the estimated pretax cost of debt for Disney is 3.75%. Using a marginal tax rate of 36.1, the after-tax cost of debt for Disney is 2.40%.

  After-Tax Cost of Debt = 3.75% (1 – 0.361) = 2.40%

- The cost of capital was calculated using these costs and the weights based on market values of equity (121,878) and debt (15.961):

  Cost of capital $= 8.52\% \frac{121,878}{(15,961+121,878)} + 2.40\% \frac{15,961}{(15,961+121,878)} = 7.81\%$

The one point we do know for Disney…

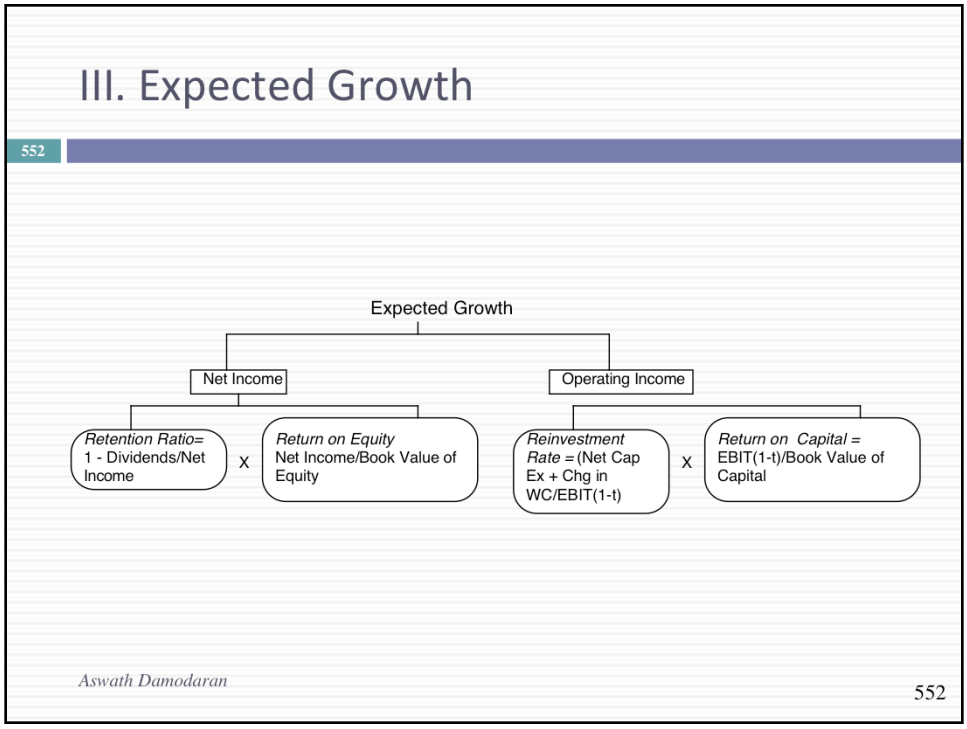
This reproduces the current cost of capital computation for Disney, using market value weights for both debt and equity, the cost of equity (based upon the bottom-up beta) and the cost of debt (based upon the bond rating)

But costs of equity and capital can and should change over time…

Year	Beta	Cost of Equity	After-tax Cost of Debt	Debt Ratio	Cost of capital
1	1.0013	8.52%	2.40%	11.50%	7.81%
2	1.0013	8.52%	2.40%	11.50%	7.81%
3	1.0013	8.52%	2.40%	11.50%	7.81%
4	1.0013	8.52%	2.40%	11.50%	7.81%
5	1.0013	8.52%	2.40%	11.50%	7.81%
6	1.0010	8.52%	2.40%	13.20%	7.71%
7	1.0008	8.51%	2.40%	14.90%	7.60%
8	1.0005	8.51%	2.40%	16.60%	7.50%
9	1.0003	8.51%	2.40%	18.30%	7.39%
10	1.0000	8.51%	2.40%	20.00%	7.29%

In the case of Disney, the debt ratio is the number that changes the most. If Disney's beta & cost of debt had been much higher or lower than that of a mature firm, those would have changed as well.

For evolving firms, with rapidly changing growth rates, the beta, the cost of debt and the debt ratio can all change over time as the firm matures.



Note that the approaches are similar, with the only difference being in how we define how much the firm reinvests and how well it reinvests.

Estimating growth in EPS: Deutsche Bank in January 2008

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- In 2007, Deutsche Bank reported net income of 6.51 billion Euros on a book value of equity of 33.475 billion Euros at the start of the year (end of 2006), and paid out 2.146 billion Euros as dividends.

  Return on Equity = $\frac{\text{Net Income}_{2007}}{\text{Book Value of Equity}_{2006}} = \frac{6,510}{33,475} = 19.45\%$

  Retention Ratio = $1 - \frac{\text{Dividends}}{\text{Net Income}} = 1 - \frac{2,146}{6,510} = 67.03\%$

- If Deutsche Bank maintains the return on equity (ROE) and retention ratio that it delivered in 2007 for the long run:

  Expected Growth Rate $_{\text{Existing Fundamentals}}$ = 0.6703 * 0.1945 = 13.04%

- If we replace the net income in 2007 with average net income of $3,954 million, from 2003 to 2007:

  Normalized Return on Equity = $\frac{\text{Average Net Income}_{2003-07}}{\text{Book Value of Equity}_{2006}} = \frac{3,954}{33,475} = 11.81\%$

  Normalized Retention Ratio = $1 - \frac{\text{Dividends}}{\text{Net Income}} = 1 - \frac{2,146}{3,954} = 45.72\%$

  Expected Growth Rate $_{\text{Normalized Fundamentals}}$ = 0.4572 * 0.1181 = 5.40%

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When forecasting future growth, we want estimates of the future retention ratio and future return on equity. While the current year's numbers may be a good place to start, we should have no qualms about replacing those numbers with normalized values.

Estimating growth in Net Income: Tata Motors

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Year	Net Income	Cap Ex	Depreciation	Change in WC	Change in Debt	Equity Reinvestment	Equity Reinvestment Rate
2008-09	-25,053₹	99,708₹	25,072₹	13,441₹	25,789₹	62,288₹	-248.63%
2009-10	29,151₹	84,754₹	39,602₹	-26,009₹	5,605₹	13,538₹	46.44%
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Aggregate	330,925₹	592,028₹	243,041₹	61,397₹	120,160₹	290,224₹	**87.70%**

Year	Net Income	BV of Equity at start of the year	ROE
2008-09	-25,053₹	91,658₹	-27.33%
2009-10	29,151₹	63,437₹	45.95%
2010-11	92,736₹	84,200₹	110.14%
2011-12	135,165₹	194,181₹	69.61%
2012-13	98,926₹	330,056₹	29.97%
Aggregate	**330,925₹**	**763,532₹**	**43.34%**

	2013 value	Average values: 2008-2013
Reinvestment rate	80.50%	87.70%
ROE	29.97%	43.34%
Expected growth	24.13%	38.01%

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We looked at both 2013 numbers and the aggregate values from 2008 to 2013. The acquisition of Landrover Jaguar has created accounting distortions in the return on equity in the years immediately after the acquisition.

ROE and Leverage

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- A high ROE, other things remaining equal, should yield a higher expected growth rate in equity earnings.
- The ROE for a firm is a function of both the quality of its investments and how much debt it uses in funding these investments. In particular

ROE = ROC + D/E (ROC - i (1-t))

where,

ROC = (EBIT (1 - tax rate)) / (Book Value of Capital)

BV of Capital = BV of Debt + BV of Equity - Cash

D/E = Debt/ Equity ratio

i = Interest rate on debt

t = Tax rate on ordinary income.

Leverage will have a positive effect on expected growth as long as the projects taken with the leverage earn more than the after-tax cost of debt.

Again, while we need to use book values if our objective is to explain past growth, looking forward, we need to make the best estimates we can for each of these inputs.

Decomposing ROE

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- Assume that you are analyzing a company with a 15% return on capital, an after-tax cost of debt of 5% and a book debt to equity ratio of 100%. Estimate the ROE for this company.
- Now assume that another company in the same sector has the same ROE as the company that you have just analyzed but no debt. Will these two firms have the same growth rates in earnings per share if they have the same dividend payout ratio?
- Will they have the same equity value?

The return on equity for the first firm = 15% + 1 (15% -5%)= 25%

The two firms, if they have the same ROE and retention ratio, will have the same earnings per share growth rate.

However, the first firm will have a higher cost of equity, since it has the higher debt ratio, and thus a lower equity value.

Estimating Growth in EBIT: Disney

- We started with the reinvestment rate that we computed from the 2013 financial statements:

  Reinvestment rate = $\frac{(3,629 + 103)}{10,032\ (1-.3102)} = 53.93\%$

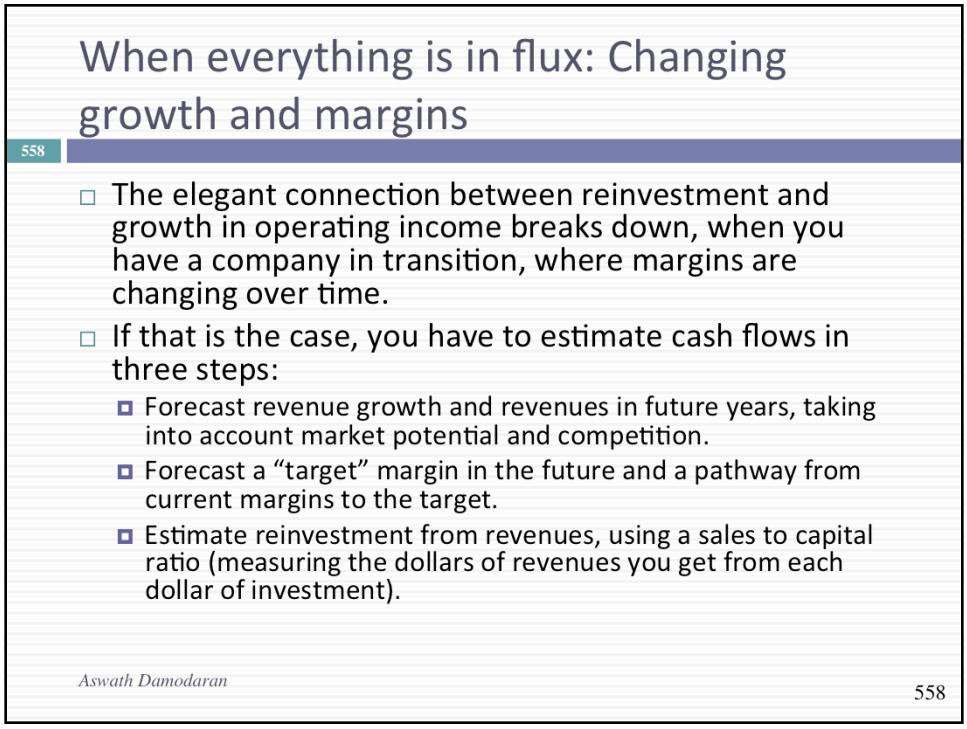
  We computed the reinvestment rate in prior years to ensure that the 2013 values were not unusual or outliers.
- We compute the return on capital, using operating income in 2013 and capital invested at the start of the year:

$$\text{Return on Capital}_{2013} = \frac{\text{EBIT (1-t)}}{\text{(BV of Equity+ BV of Debt - Cash)}} = \frac{10,032\ (1-.361)}{(41,958+ 16,328 - 3,387)} = 12.61\%$$

  Disney's return on capital has improved gradually over the last decade and has levelled off in the last two years.
- If Disney maintains its 2013 reinvestment rate and return on capital for the next five years, its growth rate will be 6.80 percent.

  Expected Growth Rate from Existing Fundamentals = 53.93% * 12.61% = 6.8%

The book value of debt is augmented by the present value of operating lease commitments. We checked both numbers (ROC and reinvestment rate) against prior years, to make sure that they looked reasonable. If not, we would have used average values over time.



Estimating the growth rate from the Reinvestment Rate and the Return on capital works only for firms with stable margins and ROC. When a company's margins are expected to change over time, you have to start with revenues and work down the cash flow statement. In making your estimates, though, you still have to tie revenue growth to reinvestment, which I accomplish using the sales to capital ration.

Here is an example: Baidu's Expected FCFF

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Year	Revenue growth	Revenues	Operating Margin	EBIT	Tax rate	EBIT (1-t)	Chg in Revenues	Sales/ Capital	Reinvestment	FCFF
Base year		$28,756	48.72%	$14,009	16.31%	$11,724		2.64		
1	25.00%	$35,945	47.35%	$17,019	16.31%	$14,243	$7,189	2.64	$2,722	$11,521
2	25.00%	$44,931	45.97%	$20,657	16.31%	$17,288	$8,986	2.64	$3,403	$13,885
3	25.00%	$56,164	44.60%	$25,051	16.31%	$20,965	$11,233	2.64	$4,253	$16,712
4	25.00%	$70,205	43.23%	$30,350	16.31%	$25,400	$14,041	2.64	$5,316	$20,084
5	25.00%	$87,756	41.86%	$36,734	16.31%	$30,743	$17,551	2.64	$6,646	$24,097
6	20.70%	$105,922	40.49%	$42,885	18.05%	$35,145	$18,166	2.64	$6,878	$28,267
7	16.40%	$123,293	39.12%	$48,227	19.79%	$38,685	$17,371	2.64	$6,577	$32,107
8	12.10%	$138,212	37.74%	$52,166	21.52%	$40,938	$14,918	2.64	$5,649	$35,289
9	7.80%	$148,992	36.37%	$54,191	23.26%	$41,585	$10,781	2.64	$4,082	$37,503
10	3.50%	$154,207	35.00%	$53,972	25.00%	$40,479	$5,215	2.64	$1,974	$38,505

Note that high revenue growth is accompanied by declining margins over time, as competition picks up and the revenues become larger. The reinvestment each year is computed by dividing the change in revenues by the sales to capital ratio to get the reinvestment each year (a composite value that includes net cap ex and change in working capital).

IV. Getting Closure in Valuation

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- Since we cannot estimate cash flows forever, we estimate cash flows for a "growth period" and then estimate a terminal value, to capture the value at the end of the period:

$$\text{Value} = \sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

- When a firm's cash flows grow at a "constant" rate forever, the present value of those cash flows can be written as:

  Value = Expected Cash Flow Next Period / (r - g)

  where,

  r = Discount rate (Cost of Equity or Cost of Capital)

  g = Expected growth rate forever.

- This "constant" growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates.

Firms have infinite lives. Since we cannot estimate cash flows forever, we assume a constant growth rate forever as a way of closing off the valuation.

A very commonly used variant is to use a multiple of the terminal year's earnings. This brings an element of relative valuation into the analysis. In a pure DCF model, the terminal value has to be estimated with a stable growth rate.

Getting to stable growth…

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- A key assumption in all discounted cash flow models is the period of high growth, and the pattern of growth during that period. In general, we can make one of three assumptions:
  - there is no high growth, in which case the firm is already in stable growth
  - there will be high growth for a period, at the end of which the growth rate will drop to the stable growth rate (2-stage)
  - there will be high growth for a period, at the end of which the growth rate will decline gradually to a stable growth rate(3-stage)
- The assumption of how long high growth will continue will depend upon several factors including:
  - the size of the firm (larger firm -> shorter high growth periods)
  - current growth rate (if high -> longer high growth period)
  - barriers to entry and differential advantages (if high -> longer growth period)

This is the shakiest area of valuation. The high growth period should be a function of a firm's capacity to earn excess returns and erect and maintain barriers to entry. This is where corporate strategy meets corporate valuation.

Choosing a Growth Period: Examples

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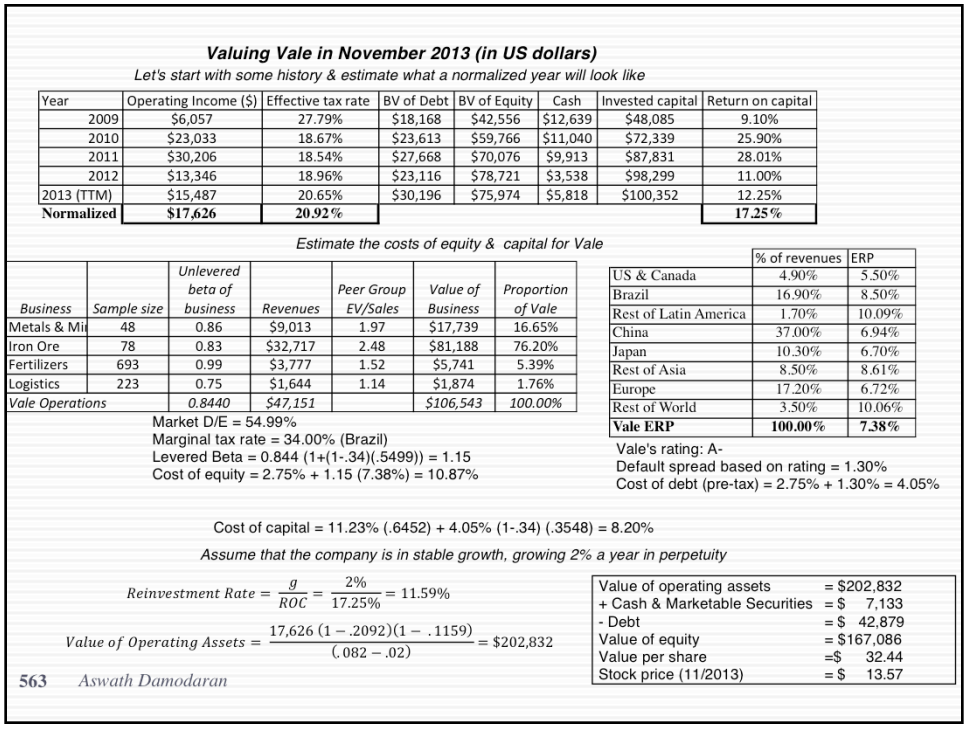
	Disney	*Vale*	*Tata Motors*	*Baidu*
Firm size/market size	Firm is one of the largest players in the entertainment and theme park business, but the businesses are being redefined and are expanding.	The company is one of the largest mining companies in the world, and the overall market is constrained by limits on resource availability.	Firm has a large market share of Indian (domestic) market, but it is small by global standards. Growth is coming from Jaguar division in emerging markets.	Company is in a growing sector (online search) in a growing market (China).
Current excess returns	Firm is earning more than its cost of capital.	Returns on capital are largely a function of commodity prices. Have generally exceeded the cost of capital.	Firm has a return on capital that is higher than the cost of capital.	Firm earns significant excess returns.
Competitive advantages	Has some of the most recognized brand names in the world. Its movie business now houses Marvel superheros, Pixar animated characters & Star Wars.	Cost advantages because of access to low-cost iron ore reserves in Brazil.	Has wide distribution/service network in India but competitive advantages are fading there.Competitive advantages in India are fading but Landrover/Jaguar has strong brand name value, giving Tata pricing power and growth potential.	Early entry into & knowledge of the Chinese market, coupled with government-imposed barriers to entry on outsiders.
Length of high-growth period	Ten years, entirely because of its strong competitive advantages/	None, though with normalized earnings and moderate excess returns.	Five years, with much of the growth coming from outside India.	Ten years, with strong excess returns.

I would not be inclined to use growth periods longer than 10 years. While there are firms like IBM, Microsoft and Coca Cola which have been able to sustain growth for much longer periods, they are more the exception than the rule. Most firms are able to maintain high growth for shorter periods.

1. I am going to use firm valuation for Disney, because I expect leverage to change, and firm valuation is simpler when that occurs
2. For Tata Motors, I will use FCFE, since I do not expect leverage to change, and do the analysis in real terms, to avoid having to deal with expected inflation in BR
3. For Deutsche Bank, where it is difficult to estimate free cash flows, I will use dividends and make the assumptions that dividends over time will be equal to FCFE.



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

563 *Aswath Damodaran*

Vale is one of the largest commodity firms in the world and we will assume that it is a mature firm. However, commodity prices do go up and down. We allow for this by normalizing earnings (by averaging over time) and use this normalized value to estimate return on capital and value.

Estimating Stable Period Inputs after a high growth period: Disney

- Respect the cap: The growth rate forever is assumed to be 2.5. This is set lower than the riskfree rate (2.75%).
- Stable period excess returns: The return on capital for Disney will drop from its high growth period level of 12.61% to a stable growth return of 10%. This is still higher than the cost of capital of 7.29% but the competitive advantages that Disney has are unlikely to dissipate completely by the end of the 10th year.
- Reinvest to grow: Based on the expected growth rate in perpetuity (2.5%) and expected return on capital forever after year 10 of 10%, we compute s a stable period reinvestment rate of 25%:
  - Reinvestment Rate = Growth Rate / Return on Capital = 2.5% /10% = 25%
- Adjust risk and cost of capital: The beta for the stock will drop to one, reflecting Disney's status as a mature company.
  - Cost of Equity = Riskfree Rate + Beta * Risk Premium = 2.75% + 5.76% = 8.51%
  - The debt ratio for Disney will rise to 20%. Since we assume that the cost of debt remains unchanged at 3.75%, this will result in a cost of capital of 7.29%
  - Cost of capital = 8.51% (.80) + 3.75% (1-.361) (.20) = 7.29%

As Disney moves into stable growth, it should exhibit the characteristics of stable growth firms. If you want to be conservative in your estimates, you could set the return on capital = cost of capital in stable growth.

The riskfree rate is a useful proxy for the nominal growth rate in the economy.

Riskfree rate = Expected inflation + Expected real interest rate

Nominal growth rate in economy = Expected inflation + Expected real growth rate

In the long term, expected real growth rate should converge on the expected real interest rate

V. From firm value to equity value per share

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Approach used	To get to equity value per share
Discount dividends per share at the cost of equity	Present value is value of equity per share
Discount aggregate FCFE at the cost of equity	Present value is value of aggregate equity. Subtract the value of equity options given to managers and divide by number of shares.
Discount aggregate FCFF at the cost of capital	PV = Value of operating assets + Cash & Near Cash investments + Value of minority cross holdings -Debt outstanding = Value of equity -Value of equity options =Value of equity in common stock / Number of shares

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The present value of the cash flows yields different output, depending upon the model used. If the ultimate mission is to compute the value of equity per share, getting there can take quite a trek, especially if you use a firm valuation model.

In effect, you have add the values of any assets whose earnings are not part of operating income (cash and minority cross holdings), subtract out the market value of non equity claims (debt foremost but also leases) and then net out the value of equity in options granted to managers and others to get to the value of equity in common stock. Since we have already considered the effect of options outstanding, this value can then be divided by the primary (not diluted) number of shares to get to value per share.

Valuing Deutsche Bank in early 2008

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- To value Deutsche Bank, we started with the normalized income over the previous five years (3,954 million Euros) and the dividends in 2008 (2,146 million Euros). We assumed that the payout ratio and ROE, based on these numbers will continue for the next 5 years:
  - Payout ratio = 2,146/3954 = 54.28%
  - Expected growth rate = (1-.5428) * .1181 = 0.054 or 5.4%
  - Cost of equity = 9.23%

Year	*Net Income*	*Payout Ratio*	*Dividends*	*PV @ 9.23%*
2008	4,167 €	54.28%	2,262 €	2,071 €
2009	4,392 €	54.28%	2,384 €	1,998 €
2010	4,629 €	54.28%	2,513 €	1,928 €
2011	4,879 €	54.28%	2,648 €	1,861 €
2012	5,143 €	54.28%	2,791 €	1,795 €
				9,653 €

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In early 2008, we were operating under the belief that Deutsche Bank, as a mature, regulated bank, was paying out what it could afford in dividends. Thus, we used the conventional dividend discount model, with a high growth period of 5 years.

Deutsche Bank in stable growth

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- At the end of year 5, the firm is in stable growth. We assume that the cost of equity drops to 8.5% (as the beta moves to 1) and that the return on equity also drops to 8.5 (to equal the cost of equity).

  Stable Period Payout Ratio = 1 – g/ROE = 1 – 0.03/0.085 = 0.6471 or 64.71%

  Expected Dividends in Year 6 = Expected Net Income$_5$ *(1+g_{Stable})* Stable Payout Ratio
  = €5,143 (1.03) * 0.6471 = €3,427 million

  Terminal Value = $\frac{\text{Expected Dividends}_6}{\text{(Cost of Equity-g)}} = \frac{3,247}{(.085-.03)} = 62,318$ million Euros

  PV of Terminal Value = $\frac{\text{Terminal Value}_n}{(1+\text{Cost of Equity}_{\text{High growth}})^n} = \frac{62,318}{(1.0923)^5} = 40,079$ mil Euros

- Value of equity = €9,653+ €40,079 = €49,732 million Euros
- Value of equity per share= $\frac{\text{Value of Equity}}{\text{\# Shares}} = \frac{49,732}{474.2} = 104.88$ Euros/share

Stock was trading at 89 Euros per share at the time of the analysis.

Note that the dividends in year 6 have to be recomputed with the new payout ratio and that the present value of the terminal value is computed using the current cost of equity (even though the terminal value itself is computed using a new cost of equity. The rationale: You have to live through the first 5 years to get to the terminal value. The risk and discount rate that applies is the rate over those 5 years.

Valuing Deutsche Bank in 2013

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	Current	1	2	3	4	5	Steady state
Risk Adjusted Assets (grows 3% a year for next 5 years)	439,851 €	453,047 €	466,638 €	480,637 €	495,056 €	509,908 €	517,556 €
Tier 1 Capital ratio (increases from 15.13% to 18.00% over next 5 years	15.13%	15.71%	16.28%	16.85%	17.43%	18.00%	18.00%
Tier 1 Capital (Risk Adjusted Assets * Tier 1 Capital Ratio)	66,561 €	71,156 €	75,967 €	81,002 €	86,271 €	91,783 €	93,160 €
Change in regulatory capital (Tier 1)		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €	1,377 €
Book Equity	76,829 €	81,424 €	86,235 €	91,270 €	96,539 €	102,051 €	103,605 €
ROE (expected to improve from -1.08% to 8.00% in year 5)	-1.08%	0.74%	2.55%	4.37%	6.18%	8.00%	8.00%
Net Income (Book Equity * ROE)	-716 €	602 €	2,203 €	3,988 €	5,971 €	8,164 €	8,287 €
- Investment in Regulatory Capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €	1,554 €
FCFE		-3,993 €	-2,608 €	-1,047 €	702 €	2,652 €	6,733 €
Terminal value of equity						103,582.19 €	
Present value		-3,669.80 €	-2,202.88 €	-812.94 €	500.72 €	69,671.28 €	
Cost of equity	8.80%	8.80%	8.80%	8.80%	8.80%	8.80%	8.00%
Value of equity today =	63,486.39 €						
Number of shares outstanding =	1019.50						
Value per share =	**62.27 €**						
Stock price in November 2013 =	**35.46 €**						

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The value of equity is the present value of the FCFE over the next five years plus the present value of the terminal value. In computing the terminal value, we use the stable period cost of equity but we discount it back to today using the high growth period cost of equity.

Valuing Tata Motors with a FCFE model in November 2013: The high growth period

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- We use the expected growth rate of 24.13%, estimated based upon the 2013 values for ROE (29.97%) and equity reinvestment rate (80.5%):
  - Expected growth rate = 29.97% * 80.5% = 24.13%
- The cost of equity for Tata Motors is 13.50%:

  Cost of equity = = 6.57% + 0.964 (7.19%) = 13.50%
- The expected FCFE for the high growth period

	Current	1	2	3	4	5
Expected growth rate		24.13%	24.13%	24.13%	24.13%	24.13%
Net Income	98,926₹	122,794₹	152,420₹	189,194₹	234,841₹	291,500₹
Equity Reinvestment Rate	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%
Equity Reinvestment	79,632₹	98,845₹	122,693₹	152,295₹	189,039₹	234,648₹
FCFE	19,294₹	23,949₹	29,727₹	36,899₹	45,802₹	56,852₹
PV of FCFE@13.5%		21,100₹	23,075₹	25,235₹	27,597₹	30,180₹

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Sum of PV of FCFE = 127,187₹

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In November 2013, we chose to value Tata Motors using a FCFE model. Implicitly we are assuming that Tata Motors is comfortable with its existing debt ratio.

Stable growth and value….

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- After year five, we will assume that the beta will increase to 1 and that the equity risk premium will decline to 6.98% percent (as the company becomes more global). The resulting cost of equity is 13.55 percent.

  Cost of Equity in Stable Growth = 6.57% + 1(6.98%) = 13.55%

- We will assume that the growth in net income will drop to 6% and that the return on equity will drop to 13.55% (which is also the cost of equity).

  Equity Reinvestment Rate $_{\text{Stable Growth}}$ = 6%/13.55% = 44.28%

  FCFE in Year 6 = ₹291,500(1.06)(1 – 0.4428) = ₹ 136,822million

  Terminal Value of Equity = ₹136,822/(0.1355 – 0.06) = ₹ 2,280,372 million

- To value equity in the firm today

  Value of equity = PV of FCFE during high growth + PV of terminal value
  = ₹127,187 + 2,280,372/1.1355^5 = ₹742,008 million

  - Dividing by 2694.08 million shares yields a value of equity per share of ₹275.42, about 40% lower than the stock price of ₹427.85 per share.

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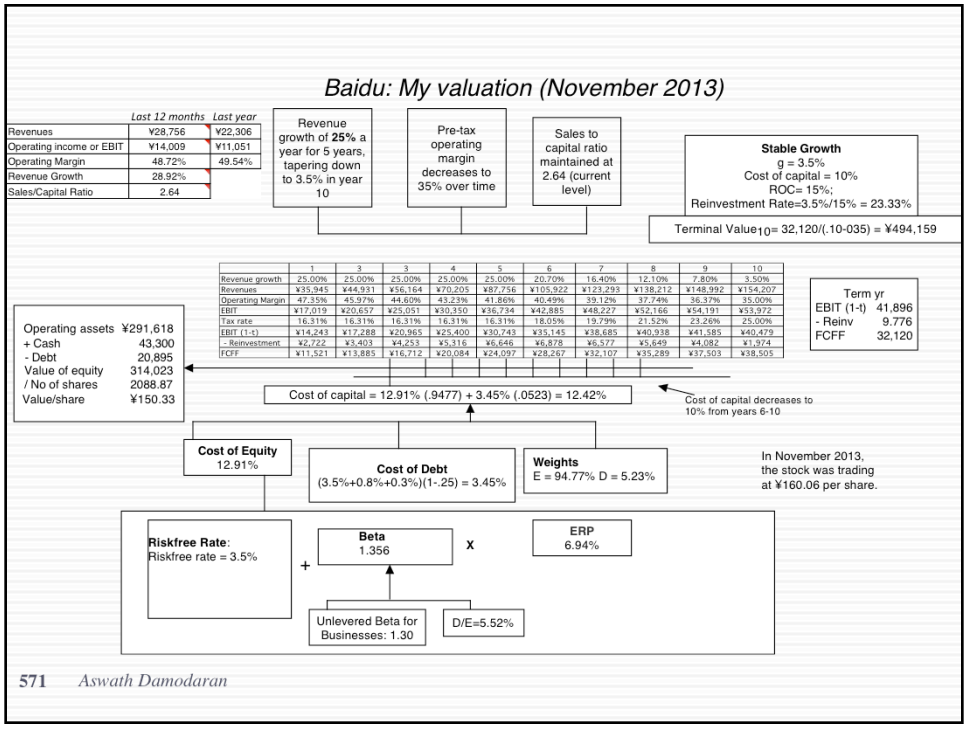
Note that the change in beta and ERP has a negligible effect on the cost of equity for Tata Motors, but that is exception, not the rule. In general, changing the beta to a mature company level in your terminal value will have a significant effect.



This is a valuation in motion, with everything changing over time: margins, reinvestment and cost of capital. The bulk of the value comes from the terminal value, which is not unusual for a high growth firm and reflects how investors make money on growth stocks (from the price appreciation, not the cash flows).

Disney: Inputs to Valuation

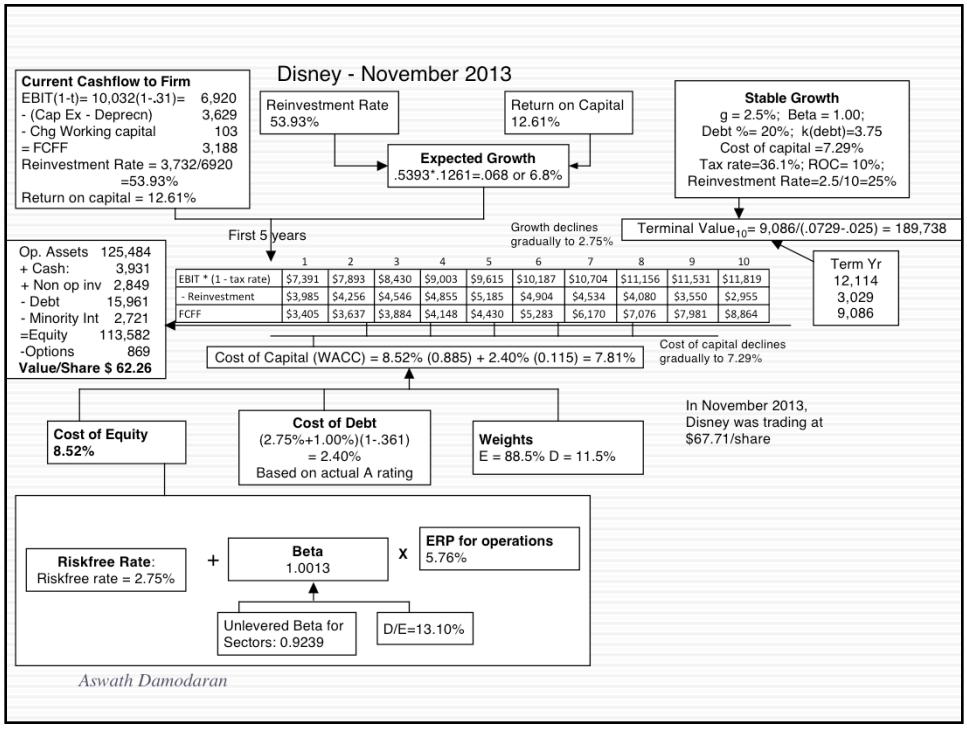
	High Growth Phase	*Transition Phase*	*Stable Growth Phase*
Length of Period	5 years	5 years	Forever after 10 years
Tax Rate	31.02% (Effective) 36.1% (Marginal)	31.02% (Effective) 36.1% (Marginal)	31.02% (Effective) 36.1% (Marginal)
Return on Capital	12.61%	Declines linearly to 10%	Stable ROC of 10%
Reinvestment Rate	53.93% (based on normalized acquisition costs)	Declines gradually to 25% as ROC and growth rates drop:	25% of after-tax operating income. Reinvestment rate = g/ ROC = 2.5/10=25%
Expected Growth Rate in EBIT	ROC * Reinvestment Rate = 0.1261*.5393 = .068 or 6.8%	Linear decline to Stable Growth Rate of 2.5%	2.5%
Debt/Capital Ratio	11.5%	Rises linearly to 20.0%	20%
Risk Parameters	Beta = 1.0013, k_e = 8.52%% Pre-tax Cost of Debt = 3.75% Cost of capital = 7.81%	Beta changes to 1.00; Cost of debt stays at 3.75% Cost of capital declines gradually to 7.29%	Beta = 1.00; k_e = 8.51% Cost of debt stays at 3.75% Cost of capital = 7.29%

The transition period is used as a phase where the inputs from the high growth period can be adjusted towards stable growth levels (which reflect industry or market averages).

Note that we estimate reinvestment needs using the expected growth rate and the return on capital.

We are making the assumption that Disney will continue to earn excess returns even in stable growth. (The return on capital is moved towards the cost of capital, but it is still higher than the cost of capital). If that assumption seems over optimistic, the return on capital in stable growth can be set equal to the cost of capital.

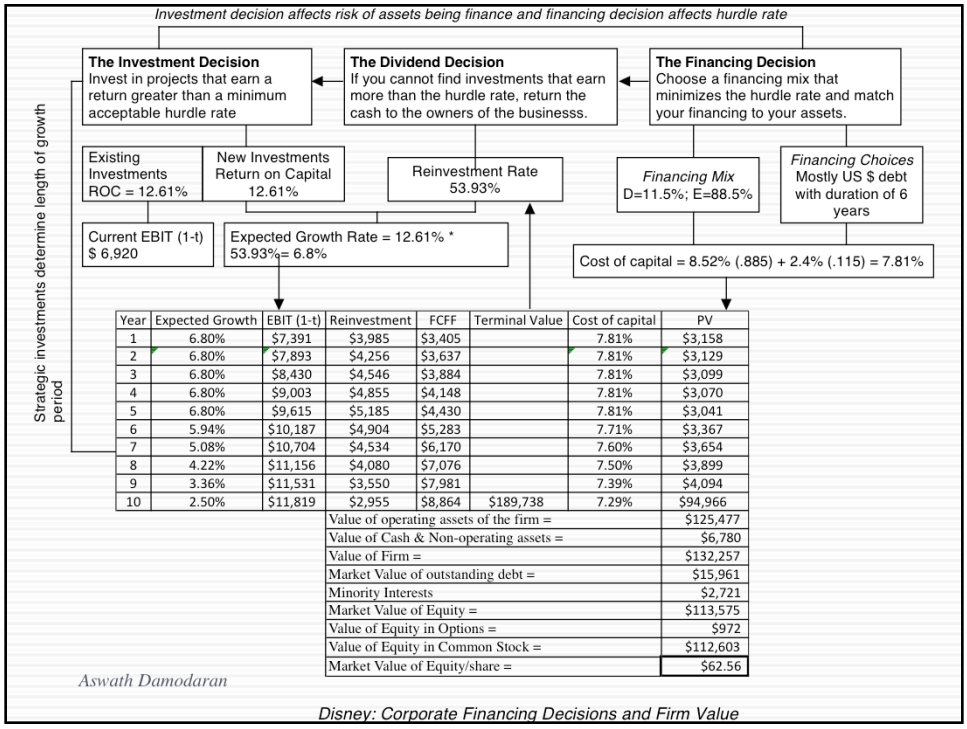
The leverage is pushed up to 20%, which is well below the optimal that we computed earlier, because current management seems intent on paying down debt.



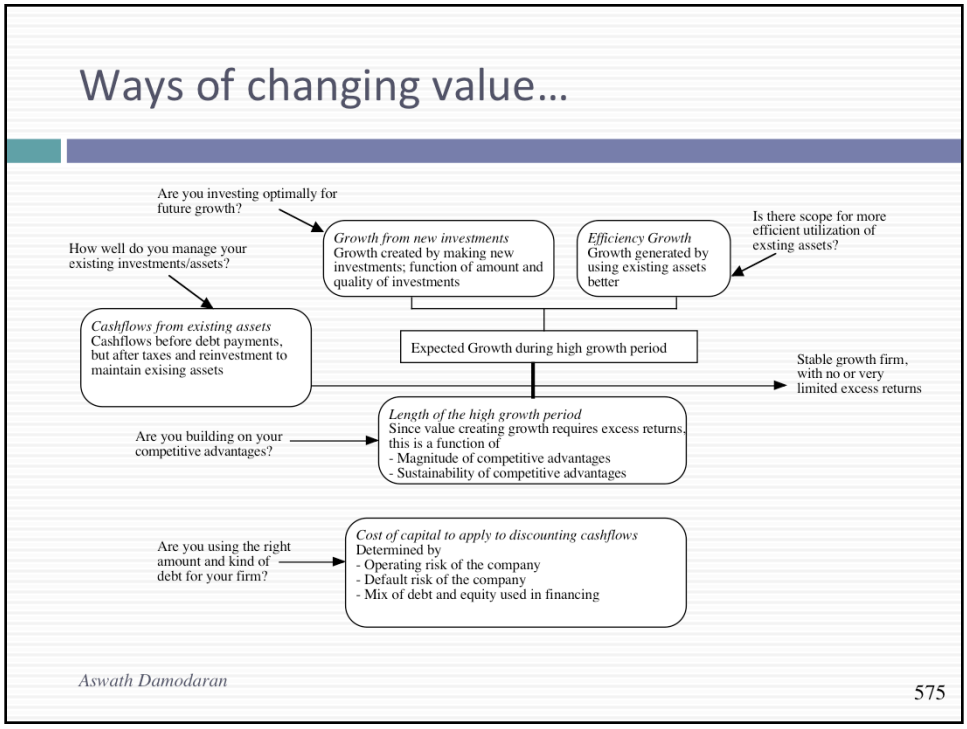
Brings it all together. Stock looks slightly over valued… or maybe the valuation is wrong…

Note that the non operating investment is the value of their minority holdings in other companies and that the minority interest reflects the value of others' holdings in companies that Disney owns a majority stake in (and has consolidated). Both were taken at book value. Optimally, we would like to get both in market value terms.

The equity options is the value of management options, valued using an option pricing model, and adjusted for taxes.



Shows the link between our valuation and the earlier corporate financial analysis.



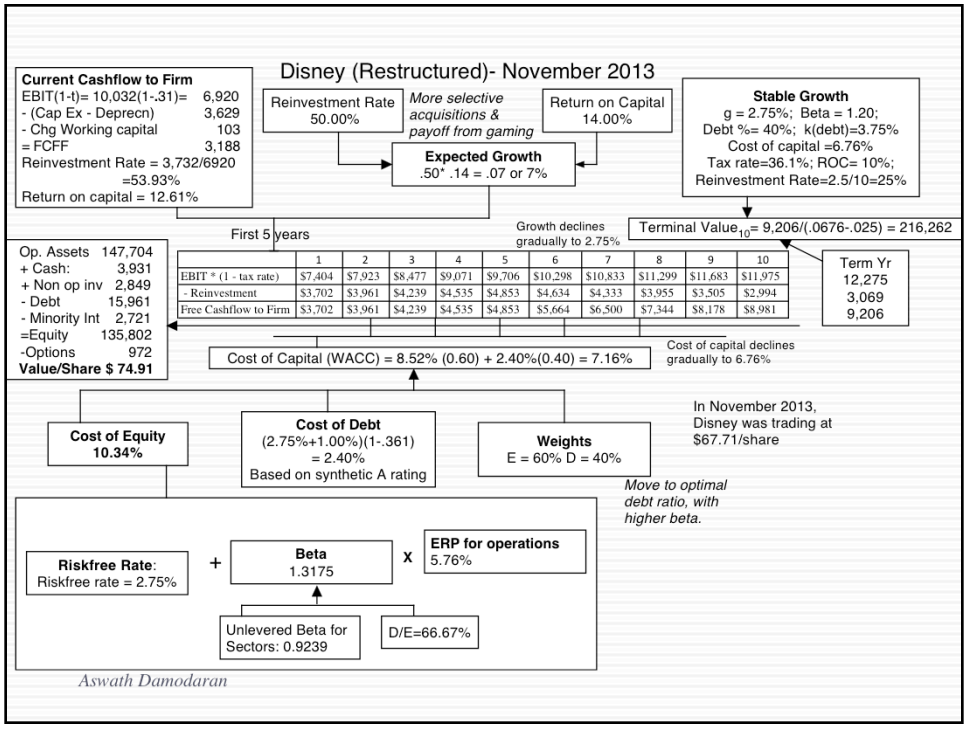
To change value, you have to take actions that affect one of four inputs:

a.Cash flows from existing assets

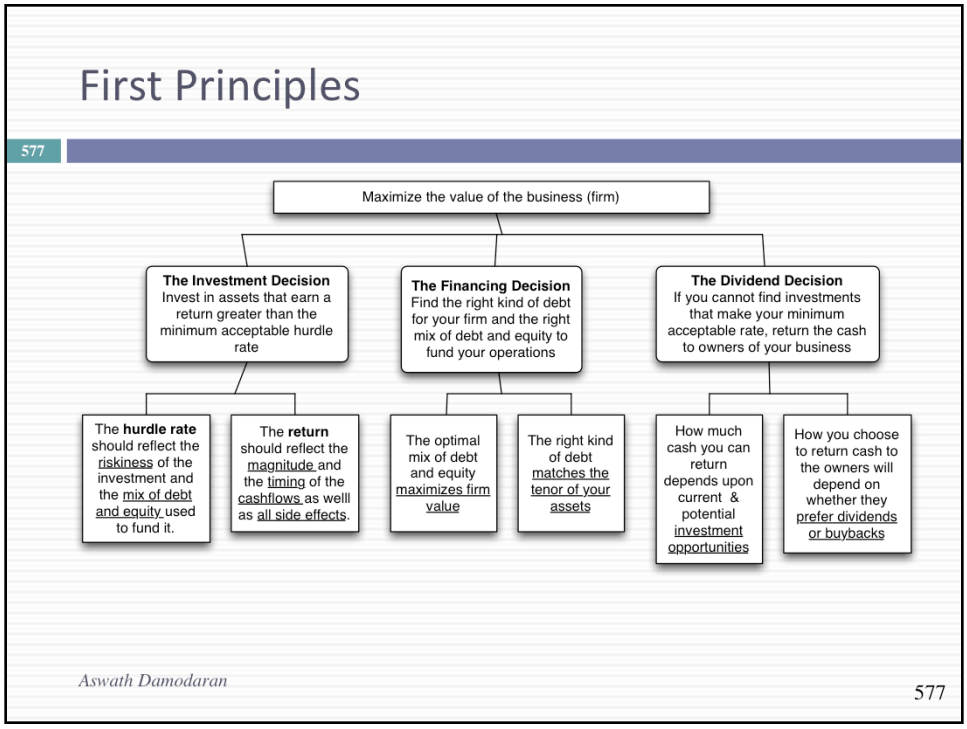
b.Expected growth

c.Cost of capital

d.Length of the growth period



Note that with two changes, a higher return on capital on new investments over the high growth phase (from 12.61% to 14%, with a slight drop in reinvestment) and moving to the optimal debt ratio of 40%, we can raise the value per share from $62.56 to $74.91. The difference of $11.35 can be viewed as the value of control. In general, the better managed a firm is, the lower will be the value of control.



As we begin, so we end.