

CORPORATE FINANCE

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LECTURE NOTES: PACKET 1

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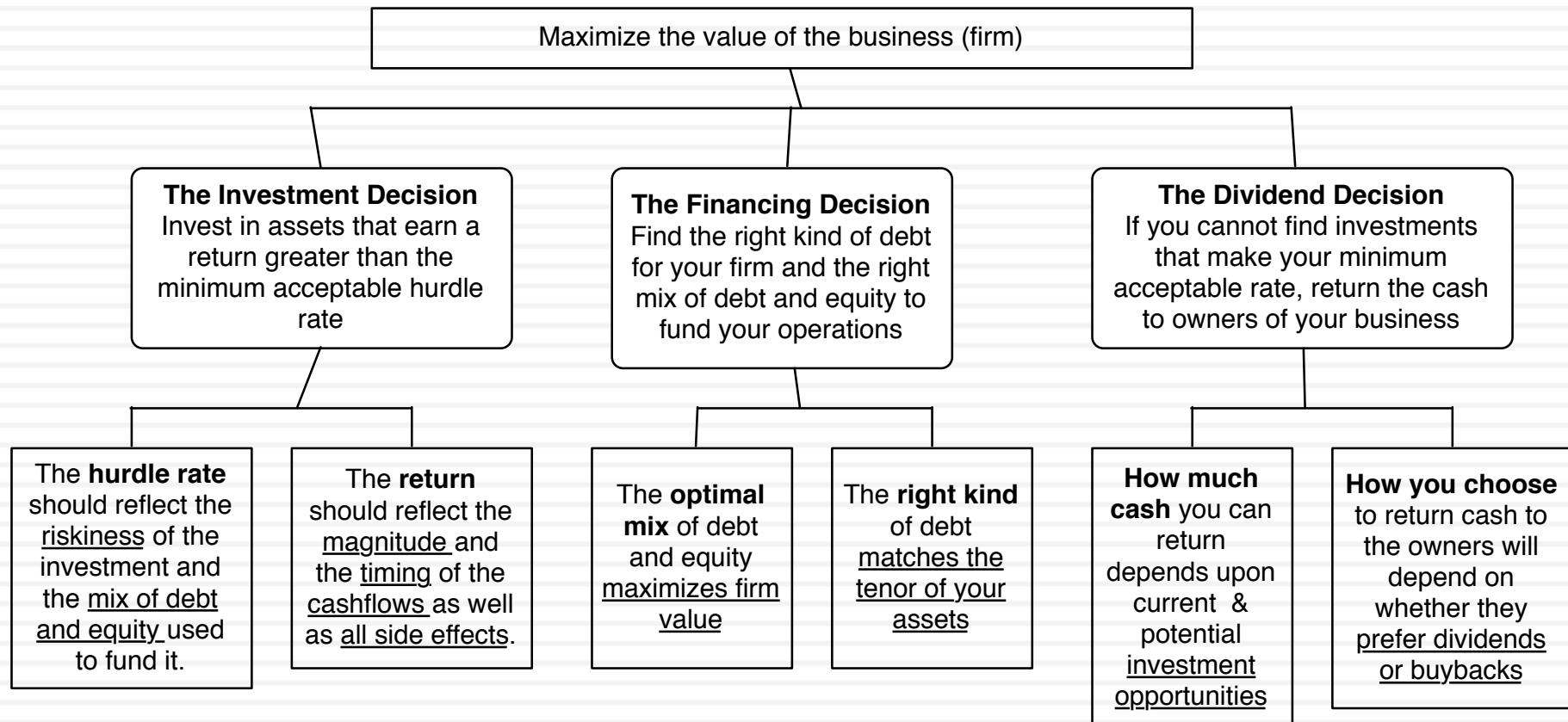
Aswath Damodaran

THE OBJECTIVE IN CORPORATE FINANCE

“If you don’t know where you are going, it doesn’t matter how you get there”

First Principles

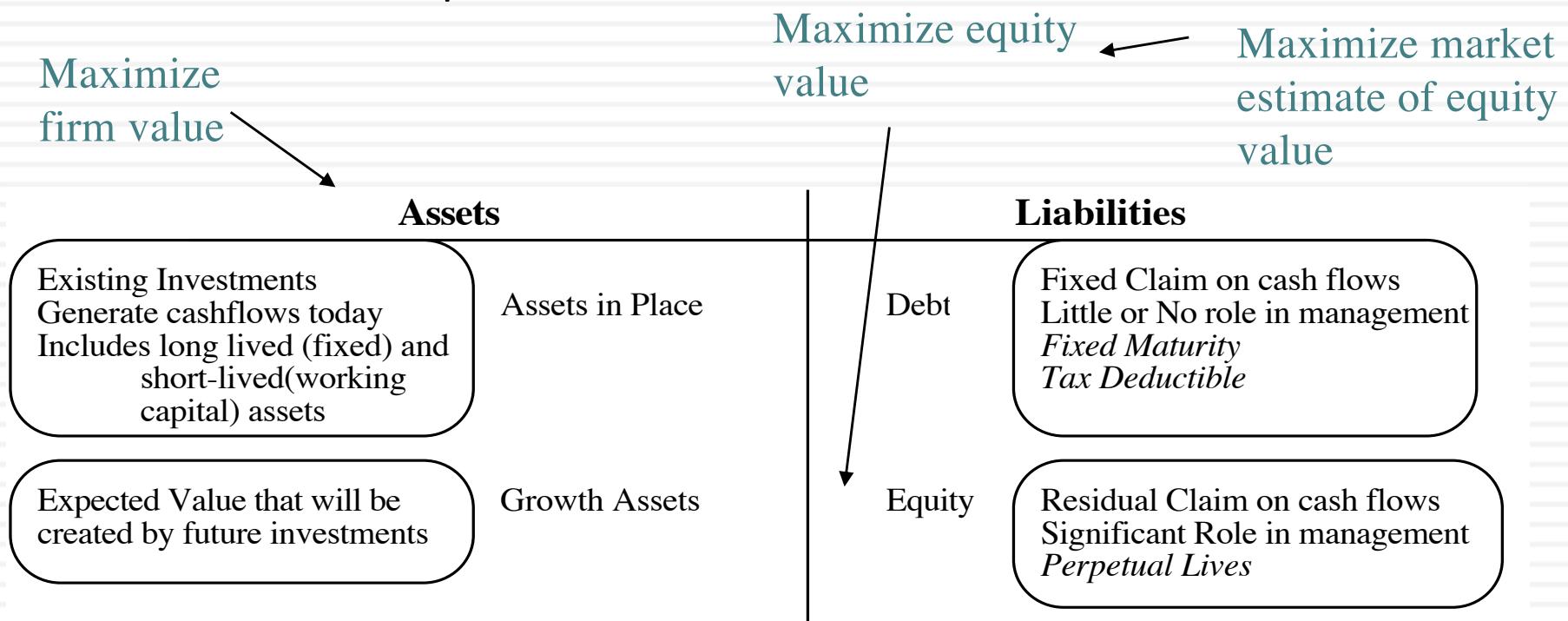
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The Objective in Decision Making

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



Maximizing Stock Prices is too “narrow” an objective: A preliminary response

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- Maximizing stock price is not incompatible with meeting employee needs/objectives. In particular:
 - ▣ Employees are often stockholders in many firms
 - ▣ Firms that maximize stock price generally are profitable firms that can afford to treat employees well.
- Maximizing stock price does not mean that customers are not critical to success. In most businesses, keeping customers happy is the route to stock price maximization.
- Maximizing stock price does not imply that a company has to be a social outlaw.

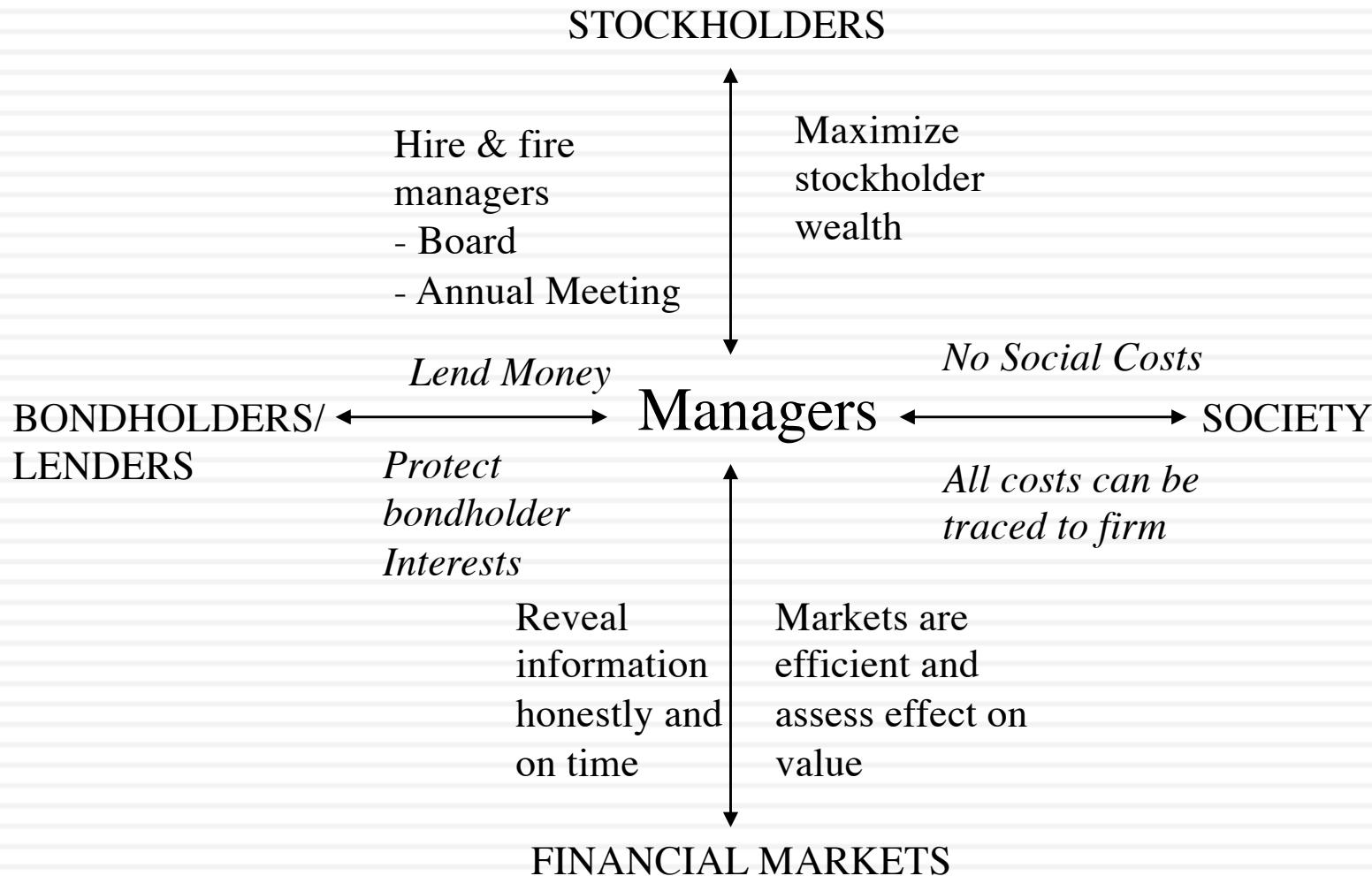
Why traditional corporate financial theory focuses on maximizing stockholder wealth.

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- Stock price is easily observable and constantly updated (unlike other measures of performance, which may not be as easily observable, and certainly not updated as frequently).
- If investors are rational (are they?), stock prices reflect the wisdom of decisions, short term and long term, instantaneously.
- The objective of stock price performance provides some very elegant theory on:
 - ▣ Allocating resources across scarce uses (which investments to take and which ones to reject)
 - ▣ how to finance these investments
 - ▣ how much to pay in dividends

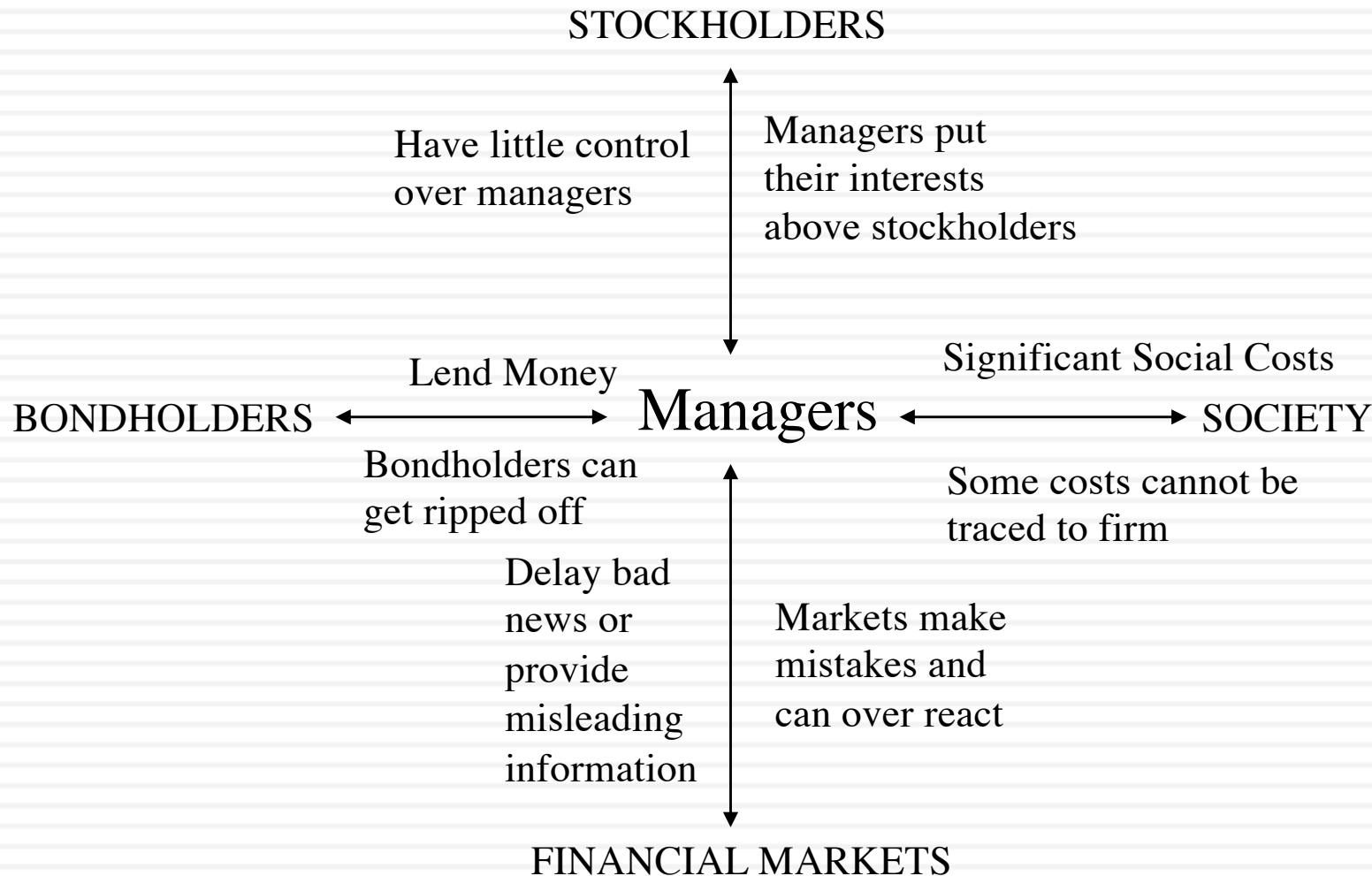
The Classical Objective Function

6



What can go wrong?

7



I. Stockholder Interests vs. Management Interests

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- In theory: The stockholders have significant control over management. The two mechanisms for disciplining management are the annual meeting and the board of directors. Specifically, we assume that
 - ▣ Stockholders who are dissatisfied with managers can not only express their disapproval at the annual meeting, but can use their voting power at the meeting to keep managers in check.
 - ▣ The board of directors plays its true role of representing stockholders and acting as a check on management.
- In Practice: Neither mechanism is as effective in disciplining management as theory posits.

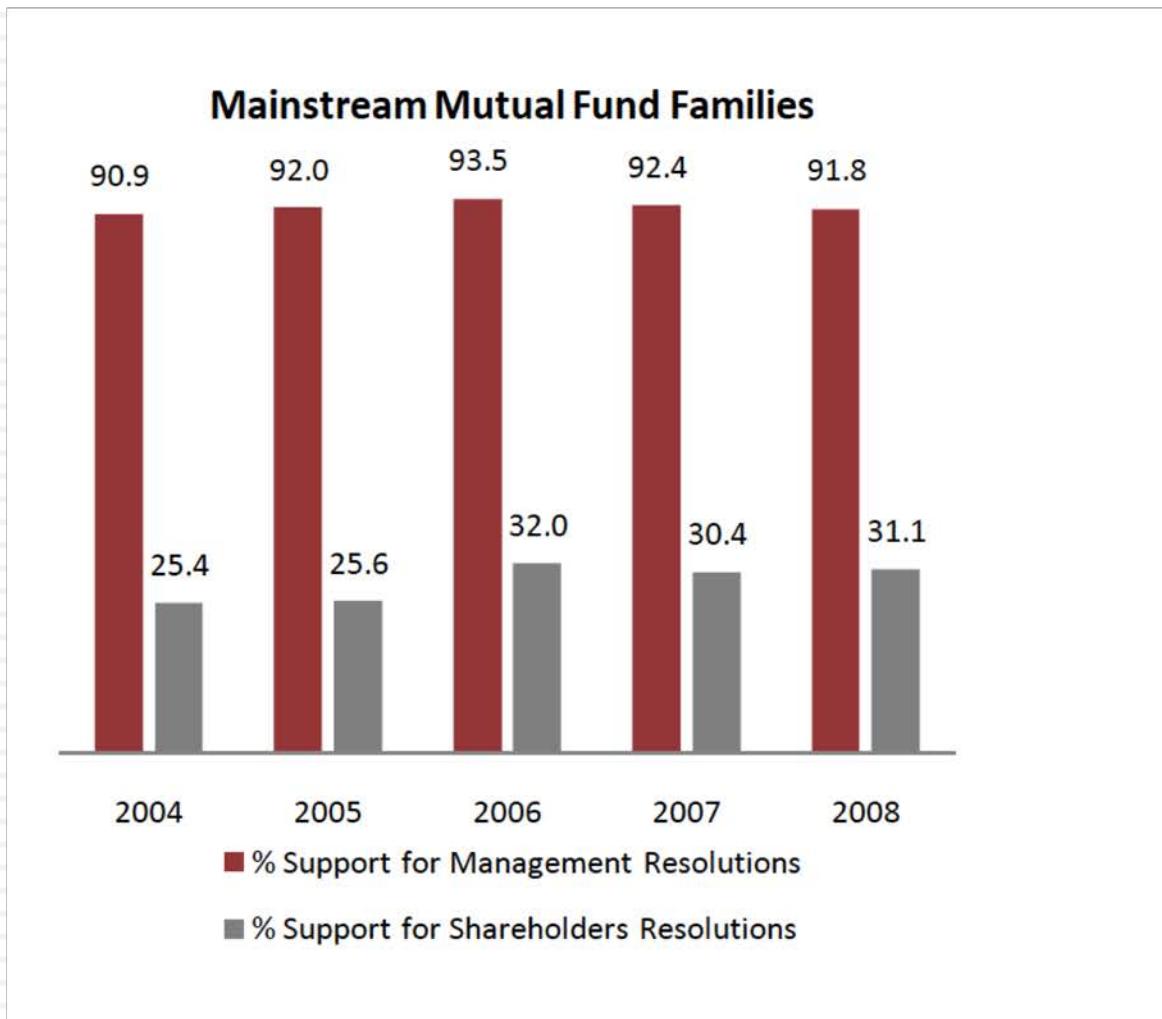
The Annual Meeting as a disciplinary venue

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- The power of stockholders to act at annual meetings is diluted by three factors
 - Most small stockholders do not go to meetings because the cost of going to the meeting exceeds the value of their holdings.
 - Incumbent management starts off with a clear advantage when it comes to the exercise of proxies. Proxies that are not voted becomes votes for incumbent management.
 - For large stockholders, the path of least resistance, when confronted by managers that they do not like, is to vote with their feet.
- Annual meetings are also tightly scripted and controlled events, making it difficult for outsiders and rebels to bring up issues that are not to the management's liking.

And institutional investors go along with incumbent managers...

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Board of Directors as a disciplinary mechanism

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- Directors are paid well: In 2010, the median board member at a Fortune 500 company was paid \$212,512, with 54% coming in stock and the remaining 46% in cash. If a board member was a non-executive chair, he or she received about \$150,000 more in compensation.
- Spend more time on their directorial duties than they used to: A board member worked, on average, about 227.5 hours a year (and that is being generous), or 4.4 hours a week, according to the National Associate of Corporate Directors. Of this, about 24 hours a year are for board meetings. Those numbers are up from what they were a decade ago.
- Even those hours are not very productive: While the time spent on being a director has gone up, a significant portion of that time was spent on making sure that they are legally protected (regulations & lawsuits).
- And they have many loyalties: Many directors serve on three or more boards, and some are full time chief executives of other companies.

The CEO often hand-picks directors..

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- CEOs pick directors: A 1992 survey by Korn/Ferry revealed that 74% of companies relied on recommendations from the CEO to come up with new directors and only 16% used an outside search firm. While that number has changed in recent years, CEOs still determine who sits on their boards. While more companies have outsiders involved in picking directors now, CEOs exercise significant influence over the process.
- Directors don't have big equity stakes: Directors often hold only token stakes in their companies. Most directors in companies today still receive more compensation as directors than they gain from their stockholdings. While share ownership is up among directors today, they usually get these shares from the firm (rather than buy them).
- And some directors are CEOs of other firms: Many directors are themselves CEOs of other firms. Worse still, there are cases where CEOs sit on each other's boards.

Directors lack the expertise (and the willingness) to ask the necessary tough questions..

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- Robert's Rules of Order? In most boards, the CEO continues to be the chair. Not surprisingly, the CEO sets the agenda, chairs the meeting and controls the information provided to directors.
- Be a team player? The search for consensus overwhelms any attempts at confrontation.
- The CEO as authority figure: Studies of social psychology have noted that loyalty is hardwired into human behavior. While this loyalty is an important tool in building up organizations, it can also lead people to suppress internal ethical standards if they conflict with loyalty to an authority figure. In a board meeting, the CEO generally becomes the authority figure.

The worst board ever? The Disney Experience - 1997

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Reveta F. Bowers 1,5 Head of School Center for Early Education	Leo J. O'Donovan, S.J. President Georgetown University
Roy E. Disney 3 Vice Chairman The Walt Disney Company	Michael S. Ovitz 3 President The Walt Disney Company
Michael D. Eisner 3 Chairman and Chief Executive Officer The Walt Disney Company	Sidney Poitier 2,4 Chief Executive Officer Verdon-Cedric Productions
Stanley P. Gold 4,5 President and Chief Executive Officer Shamrock Holdings, Inc.	Irwin E. Russell 2,4 Attorney at Law
Sanford M. Litwack Senior Executive Vice President and Chief of Corporate Operations The Walt Disney Company	Robert A.M. Stern Senior Partner Productions
Ignacio E. Lozano, Jr. 1,2,4 Editor-in-Chief, LA OPINION	E. Cardon Walker 1 Former Chairman and Chief Executive Officer The Walt Disney Company
George J. Mitchell 5 Special Counsel Verner, Liipfert, Bernard, McPherson and Hand	Raymond L. Watson 1,2,3 Vice Chairman The Irvine Company
Thomas S. Murphy Former Chairman Capital Cities/ABC, Inc.	Gary L. Wilson 5 Co-Chairman Northwest Airlines Corporation
Richard A. Nunis Chairman Walt Disney Attractions	1 Member of Audit Review Committee 2 Member of Compensation Committee 3 Member of Executive Committee 4 Member of Executive Performance Plan Committee 5 Member of Nominating Committee

The Calpers Tests for Independent Boards

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- Calpers, the California Employees Pension fund, suggested three tests in 1997 of an independent board:
 - ▣ Are a majority of the directors outside directors?
 - ▣ Is the chairman of the board independent of the company (and not the CEO of the company)?
 - ▣ Are the compensation and audit committees composed entirely of outsiders?
- Disney was the only S&P 500 company to fail all three tests.

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

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THE WORST BOARDS OF DIRECTORS											
RANK	OVERALL SCORE	SURVEY SCORE	ANALYSIS SCORE	DETAILS	BOARD PERFORMANCE POLL				GOVERNANCE GUIDELINE ANALYSIS		
					SHAREHOLDER ACCOUNTABILITY	BOARD QUALITY	BOARD INDEPENDENCE	CORPORATE PERFORMANCE	SHAREHOLDER ACCOUNTABILITY	BOARD QUALITY	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

Application Test: Who's on board?

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- Look at the board of directors for your firm.
 - How many of the directors are inside directors (Employees of the firm, ex-managers)?
 - Is there any information on how independent the directors in the firm are from the managers?
- Are there any external measures of the quality of corporate governance of your firm?
 - Yahoo! Finance now reports on a corporate governance score for firms, where it ranks firms against the rest of the market and against their sectors.
- Is there tangible evidence that your board acts independently of management?
 - Check news stories to see if there are actions that the CEO has wanted to take that the board has stopped him or her from taking or at least slowed him or her down.

So, what next? When the cat is idle, the mice will play

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- When managers do not fear stockholders, they will often put their interests over stockholder interests
 - Greenmail: The (managers of) target of a hostile takeover buy out the potential acquirer's existing stake, at a price much greater than the price paid by the raider, in return for the signing of a 'standstill' agreement.
 - Golden Parachutes: Provisions in employment contracts, that allows for the payment of a lump-sum or cash flows over a period, if managers covered by these contracts lose their jobs in a takeover.
 - Poison Pills: A security, the rights or cashflows on which are triggered by an outside event, generally a hostile takeover, is called a poison pill.
 - Shark Repellents: Anti-takeover amendments are also aimed at dissuading hostile takeovers, but differ on one very important count. They require the assent of stockholders to be instituted.
 - Overpaying on takeovers: Acquisitions often are driven by management interests rather than stockholder interests.

No stockholder approval needed.... Stockholder Approval needed

Managerial Self Interest or Stockholder Wealth? Overpaying on takeovers!

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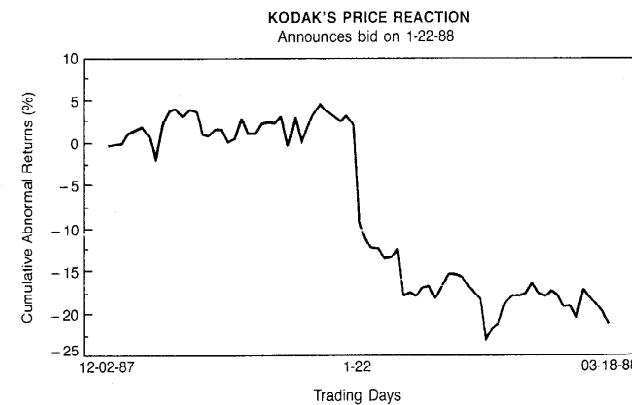
- The quickest and perhaps the most decisive way to impoverish stockholders is to overpay on a takeover.
- The stockholders in acquiring firms do not seem to share the enthusiasm of the managers in these firms. Stock prices of bidding firms decline on the takeover announcements a significant proportion of the time.
- Many mergers do not work, as evidenced by a number of measures.
 - ▣ The profitability of merged firms relative to their peer groups, does not increase significantly after mergers.
 - ▣ An even more damning indictment is that a large number of mergers are reversed within a few years, which is a clear admission that the acquisitions did not work.

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!!!!



Kodak's market reaction indicates that investors expected no synergies:

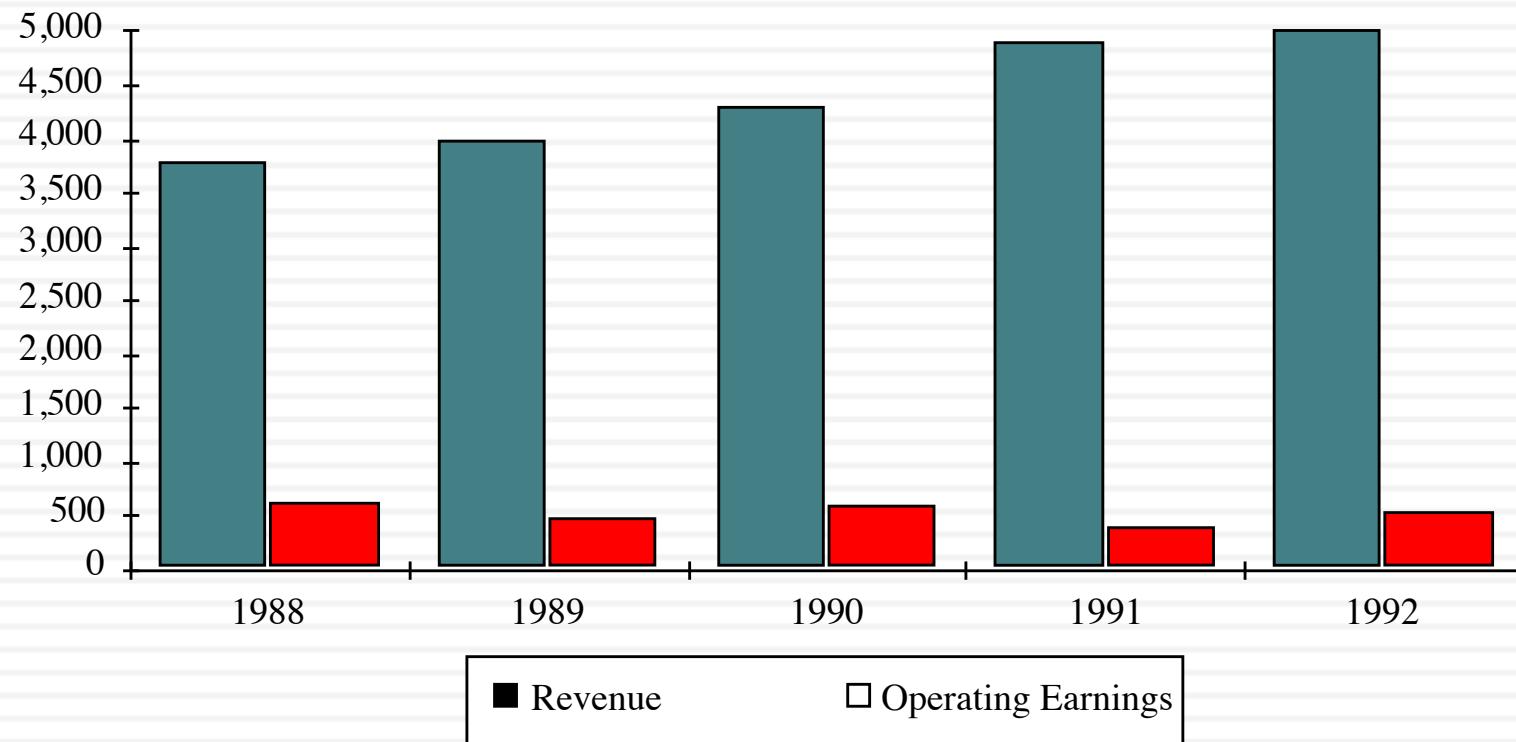
Kodak's bid =	\$5.1 billion
Sterling's market value 30 days prior to announcement =	3.0 billion
Premium bid	\$2.1 billion
Decrease in Kodak's market value =	\$2.2 billion

SOURCE: The Alcar Group, Inc.

Earnings and Revenues at Sterling Drugs

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Sterling Drug under Eastman Kodak: Where is the synergy?



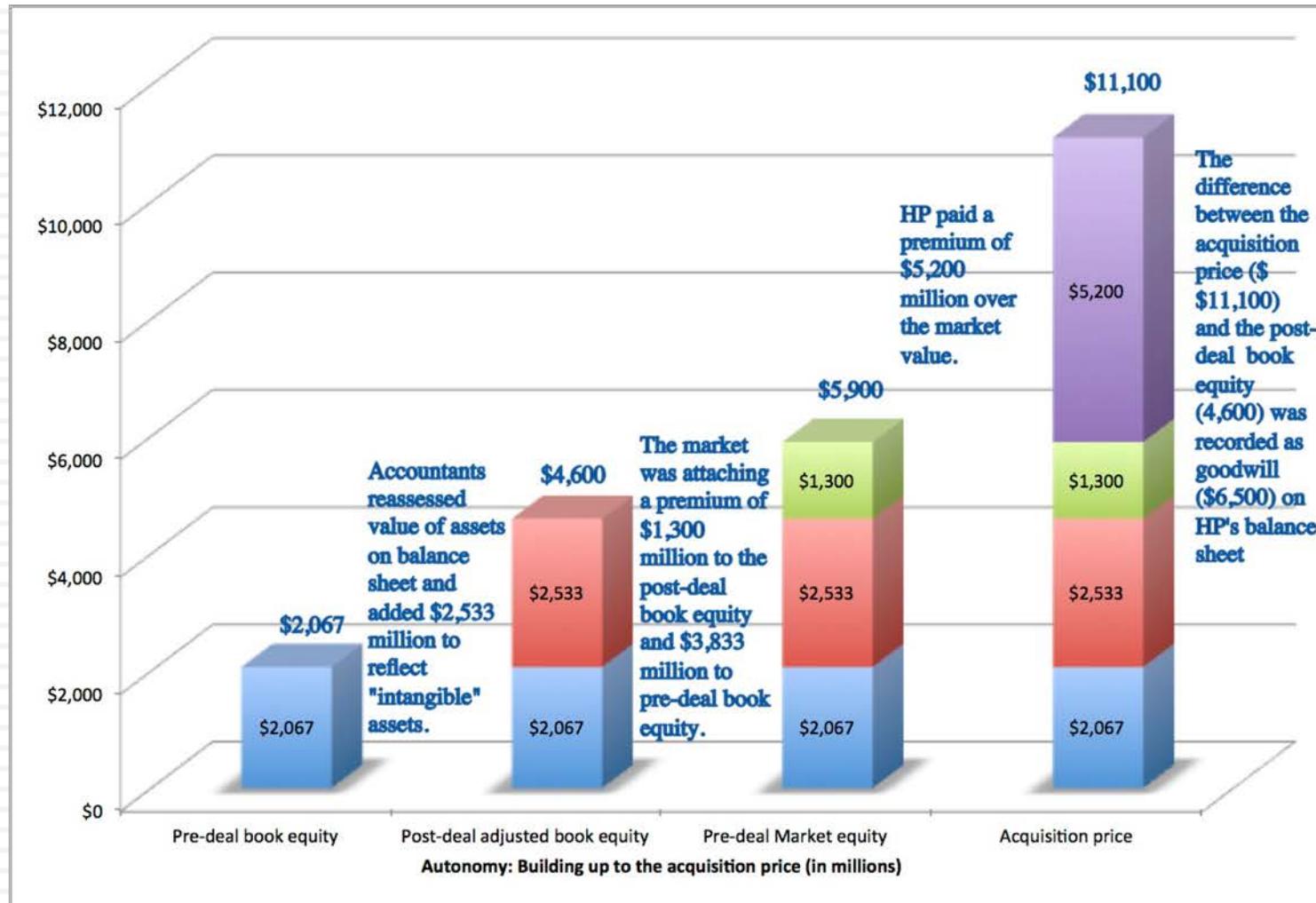
Kodak Says Drug Unit Is Not for Sale ... but...

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- An article in the NY Times in August of 1993 suggested that Kodak was eager to shed its drug unit.
 - ▣ In response, Eastman Kodak officials say they have no plans to sell Kodak's Sterling Winthrop drug unit.
 - ▣ Louis Mattis, Chairman of Sterling Winthrop, dismissed the rumors as "massive speculation, which flies in the face of the stated intent of Kodak that it is committed to be in the health business."
- A few months later...Taking a stride out of the drug business, Eastman Kodak said that the Sanofi Group, a French pharmaceutical company, agreed to buy the prescription drug business of Sterling Winthrop for \$1.68 billion.
 - ▣ Shares of Eastman Kodak rose 75 cents yesterday, closing at \$47.50 on the New York Stock Exchange.
 - ▣ Samuel D. Isaly an analyst , said the announcement was "very good for Sanofi and very good for Kodak."
 - ▣ "When the divestitures are complete, Kodak will be entirely focused on imaging," said George M. C. Fisher, the company's chief executive.
 - ▣ The rest of the Sterling Winthrop was sold to Smithkline for \$2.9 billion.

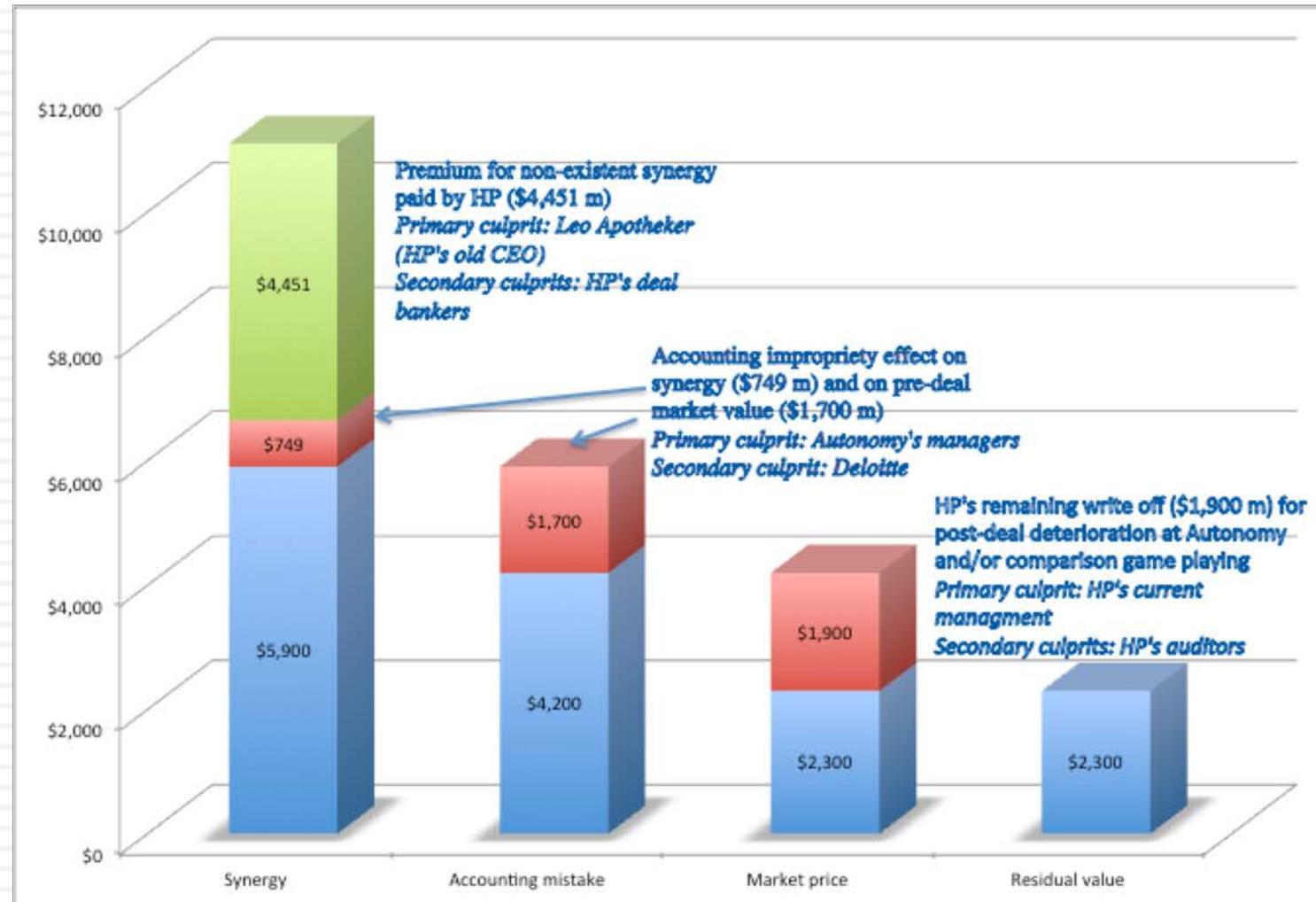
The connection to corporate governance: HP buys Autonomy... and explains the premium

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A year later... HP admits a mistake...and explains it...

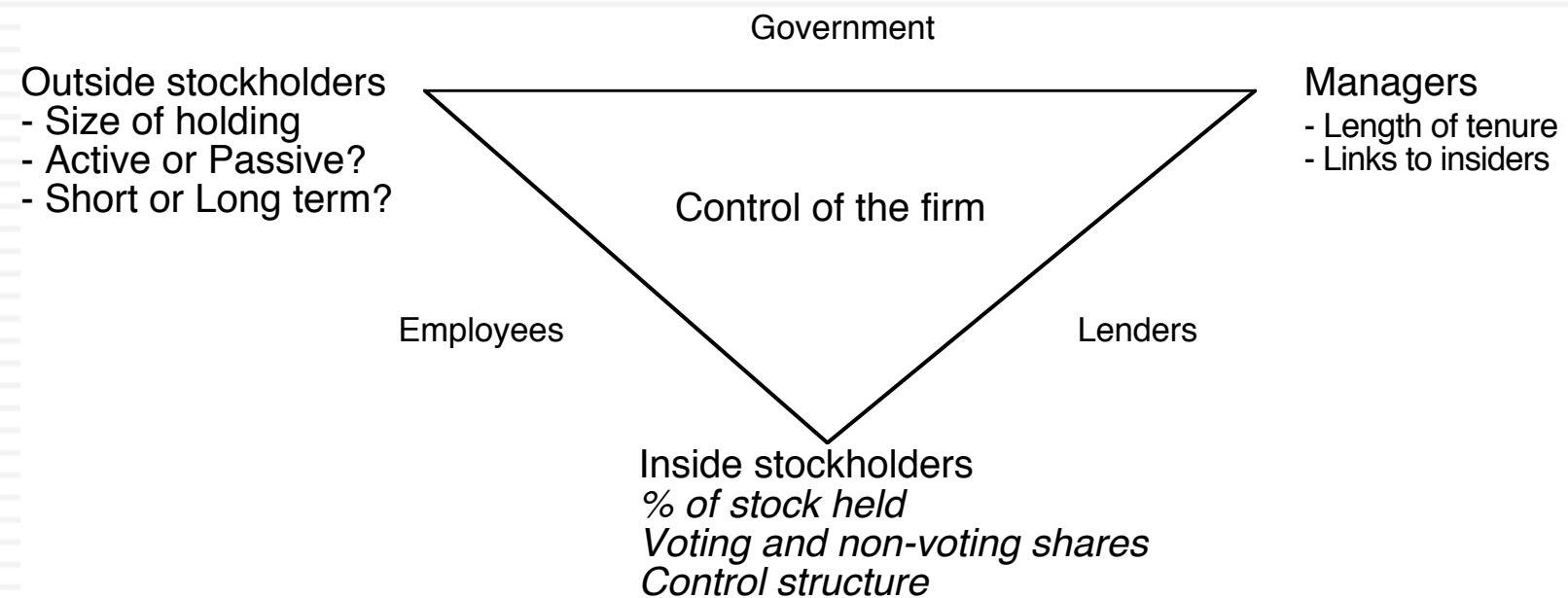
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Application Test: Who owns/runs your firm?

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- Look at: Bloomberg printout HDS for your firm
- Who are the top stockholders in your firm?
- What are the potential conflicts of interests that you see emerging from this stockholding structure?



Case 1: Splintering of Stockholders

Disney's top stockholders in 2003

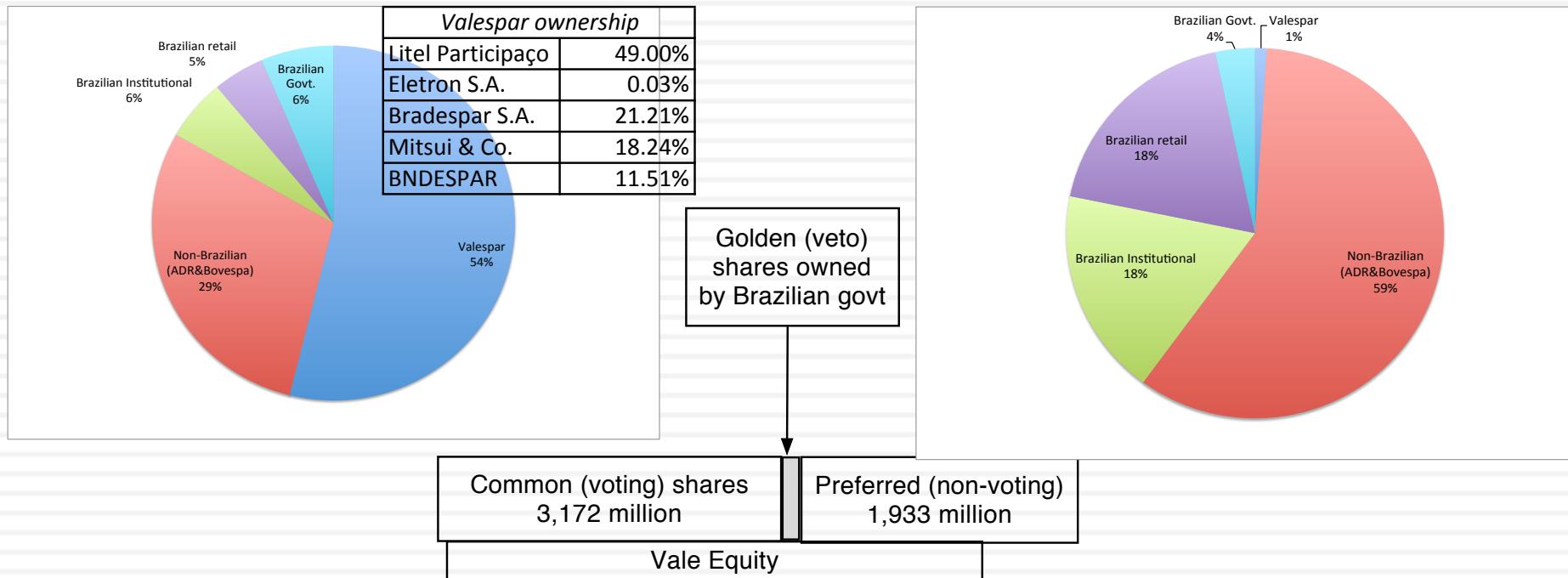
<HELP> for explanation.
Enter #<GO> to select aggregate portfolio and see detailed information

001109650224-000 **HOLDINGS SEARCH** CUSIP 25468710
DIS **US** **DISNEY (WALT) CO** Page 1 / 100

Holder name	Portfolio Name	Source	Held	Outstd	Percent	Latest Filing Date
BARCLAYS GLOBAL	BARCLAYS BANK PLC	13F	83,630M	4,095	1.750M	09/02
CITIGROUP INC	CITIGROUP INCORPORAT	13F	62,857M	3,078	4,811M	09/02
FIDELITY MANAGEM	FIDELITY MANAGEMENT	13F	56,125M	2,748	5,992M	09/02
STATE STREET	STATE STREET CORPORA	13F	54,635M	2,675	2,239M	09/02
SOUTHEASTRN ASST	SOUTHEASTERN ASSET M	13F	47,333M	2,318	14,604M	09/02
STATE FARM MU AUTO	STATE FARM MUTUAL AU	13F	41,938M	2,054	120,599	09/02
VANGUARD GROUP	VANGUARD GROUP INC	13F	34,721M	1,700	-83,839	09/02
MELLON BANK N A	MELLON BANK CORP	13F	32,693M	1,601	957,489	09/02
PUTNAM INVEST	PUTNAM INVESTMENT MA	13F	28,153M	1,379	-11,468M	09/02
LORD ABBETT & CO	LORD ABBETT & CO	13F	24,541M	1,202	5,385M	09/02
MONTAG CALDWELL	MONTAG & CALDWELL IN	13F	24,466M	1,198	-11,373M	09/02
DEUTSCHE BANK AK	DEUTSCHE BANK AG	13F	23,239M	1,138	-5,002M	09/02
MORGAN STANLEY	MORGAN STANLEY	13F	19,655M	0,962	3,482M	09/02
T ROWE PRICE	T ROWE PRICE ASSOCIA	13F	19,133M	0,937	2,925M	09/02
EDWARD DISNE	n/a PROXY	13F	17,547M	0,859-126,710	12/01	
ALLIANCE FINANCIAL	ALLIANCE CAPITAL MAN	13F	14,283M	0,699	69,353	09/02
JP MORGAN CHASE	JP MORGAN CHASE & CO	13F	14,209M	0,696-462,791	09/02	
Sub-totals for current page:				599,159M	29,340	
* Money market directory info available. Select portfolio, then hit IP<GO>.						
Australia 61 2 8777 8600	Brazil 5511 2048 4500	Europe 44 20 7399 7999		Germany 49 89 906410		
Hong Kong 852 2377 6000	Japan 81 3 3281 6900	Singapore 65 212 1800	U.S. 1 212 319 2000	Copyright 2002 Bloomberg L.P.		
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Case 2: Voting versus Non-voting Shares & Golden Shares: Vale



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

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

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. 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	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 MGMT	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. ■ NORGE'S 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%

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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

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.

Things change.. Disney's top stockholders in 2009

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DIS US \$ ↑ **24.2422** +.7422 D 2s EquityHDS
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 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)	JOBSS 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
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 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2009 Bloomberg Finance L.P.
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II. Stockholders' objectives vs. Bondholders' objectives

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- *In theory*: there is no conflict of interests between stockholders and bondholders.
- *In practice*: Stockholder and bondholders have different objectives. Bondholders are concerned most about safety and ensuring that they get paid their claims. Stockholders are more likely to think about upside potential

Examples of the conflict..

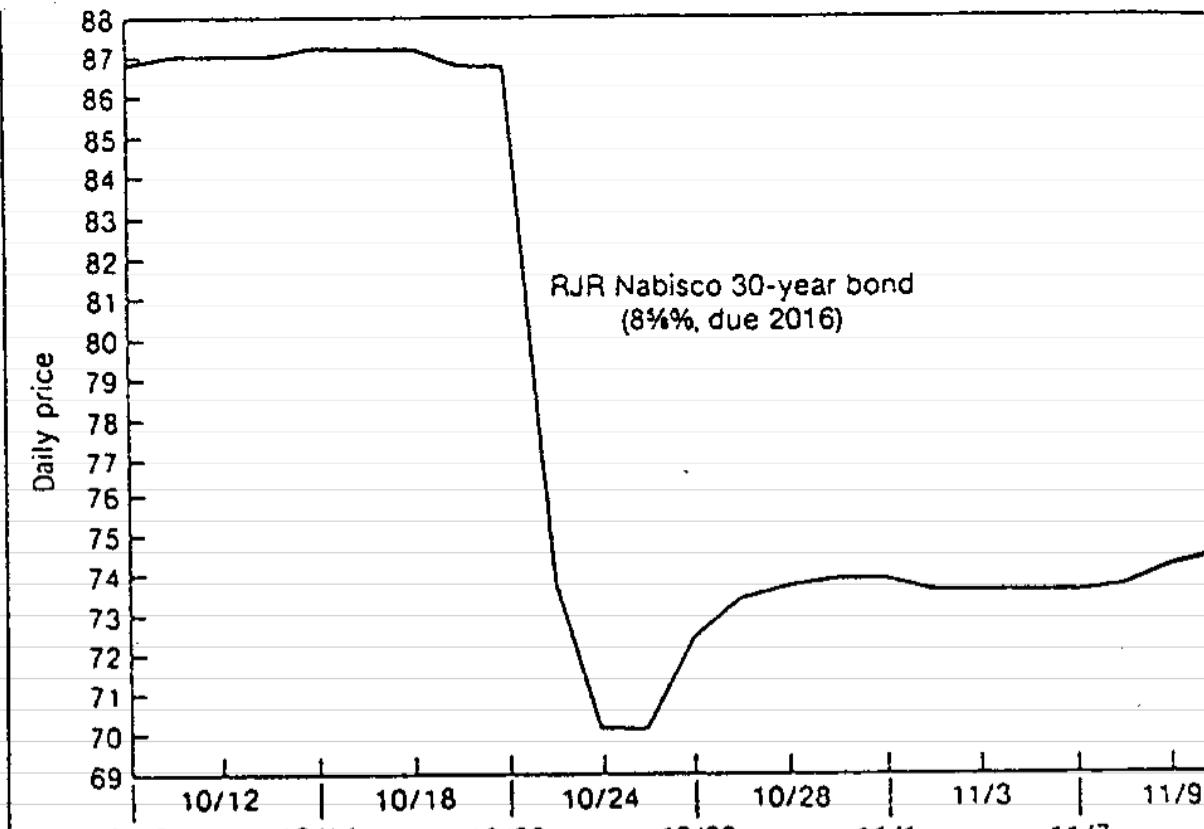
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- A dividend/buyback surge: When firms pay cash out as dividends, lenders to the firm are hurt and stockholders may be helped. This is because the firm becomes riskier without the cash.
- Risk shifting: When a firm takes riskier projects than those agreed to at the outset, lenders are hurt. Lenders base interest rates on their perceptions of how risky a firm's investments are. If stockholders then take on riskier investments, lenders will be hurt.
- Borrowing more on the same assets: If lenders do not protect themselves, a firm can borrow more money and make all existing lenders worse off.

An Extreme Example: Unprotected Lenders?

33

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



III. Firms and Financial Markets

34

- In theory: Financial markets are efficient. Managers convey information honestly and in a timely manner to financial markets, and financial markets make reasoned judgments of the effects of this information on 'true value'. As a consequence-
 - ▣ A company that invests in good long term projects will be rewarded.
 - ▣ Short term accounting gimmicks will not lead to increases in market value.
 - ▣ Stock price performance is a good measure of company performance.
- In practice: There are some holes in the 'Efficient Markets' assumption.

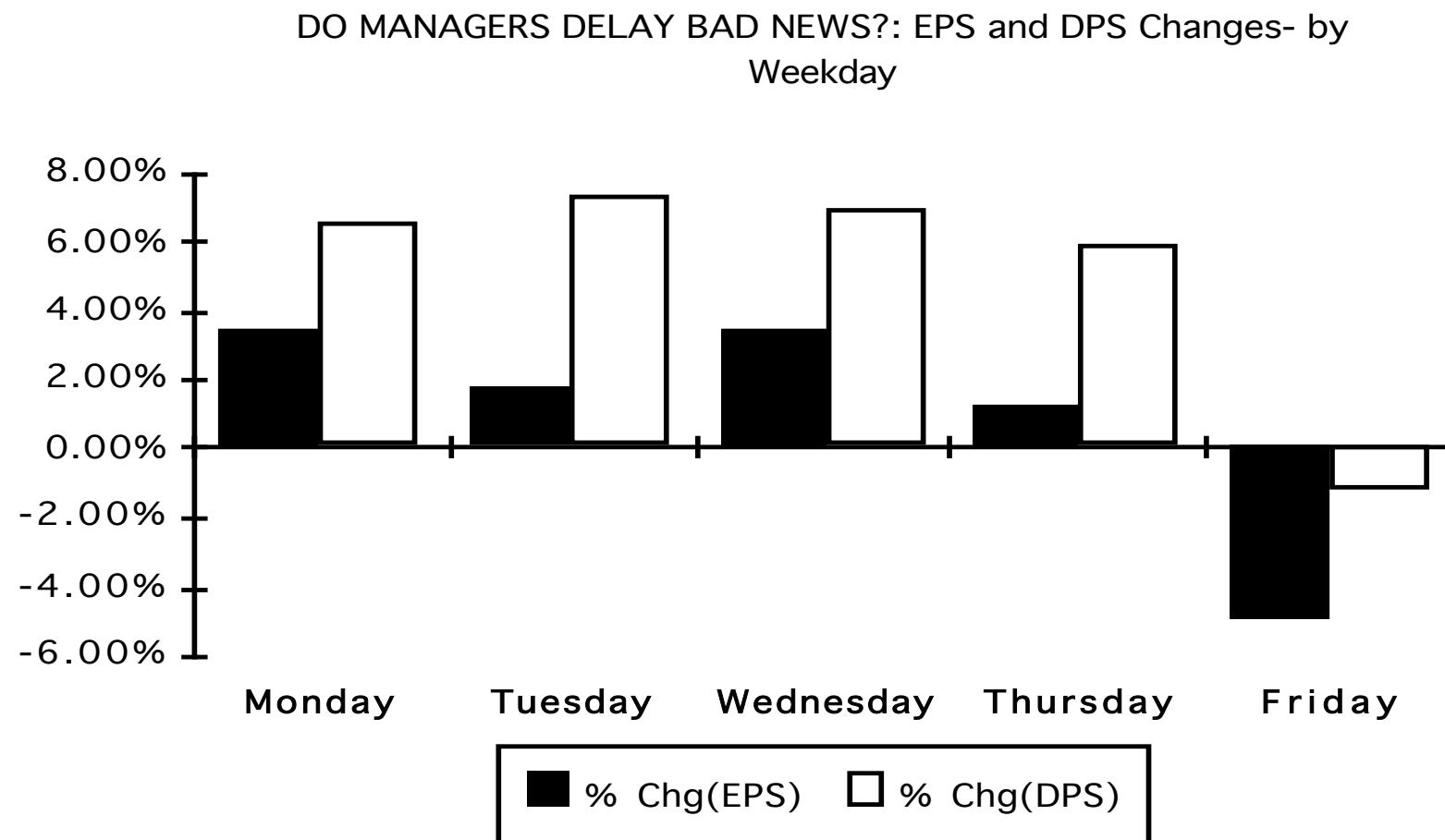
Managers control the release of information to the general public

35

- Information management (timing and spin): Information (especially negative) is sometimes suppressed or delayed by managers seeking a better time to release it. When the information is released, firms find ways to “spin” or “frame” it to put themselves in the best possible light.
- Outright fraud: In some cases, firms release intentionally misleading information about their current conditions and future prospects to financial markets.

Evidence that managers delay bad news?

36



Some critiques of market efficiency..

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- Investor irrationality: The base argument is that investors are irrational and prices often move for no reason at all. As a consequence, prices are much more volatile than justified by the underlying fundamentals. Earnings and dividends are much less volatile than stock prices.
- Manifestations of irrationality
 - Reaction to news: Some believe that investors overreact to news, both good and bad. Others believe that investors sometimes under react to big news stories.
 - An insider conspiracy: Financial markets are manipulated by insiders; Prices do not have any relationship to value.
 - Short termism: Investors are short-sighted, and do not consider the long-term implications of actions taken by the firm

Are markets short sighted and too focused on the near term? What do you think?

38

- Focusing on market prices will lead companies towards short term decisions at the expense of long term value.
 - a. I agree with the statement
 - b. I do not agree with this statement
- Allowing managers to make decisions without having to worry about the effect on market prices will lead to better long term decisions.
 - a. I agree with this statement
 - b. I do not agree with this statement
- Neither managers nor markets are trustworthy. Regulations/laws should be written that force firms to make long term decisions.
 - a. I agree with this statement
 - b. I do not agree with this statement

Are markets short term? Some counter (albeit not conclusive) evidence that they are not..

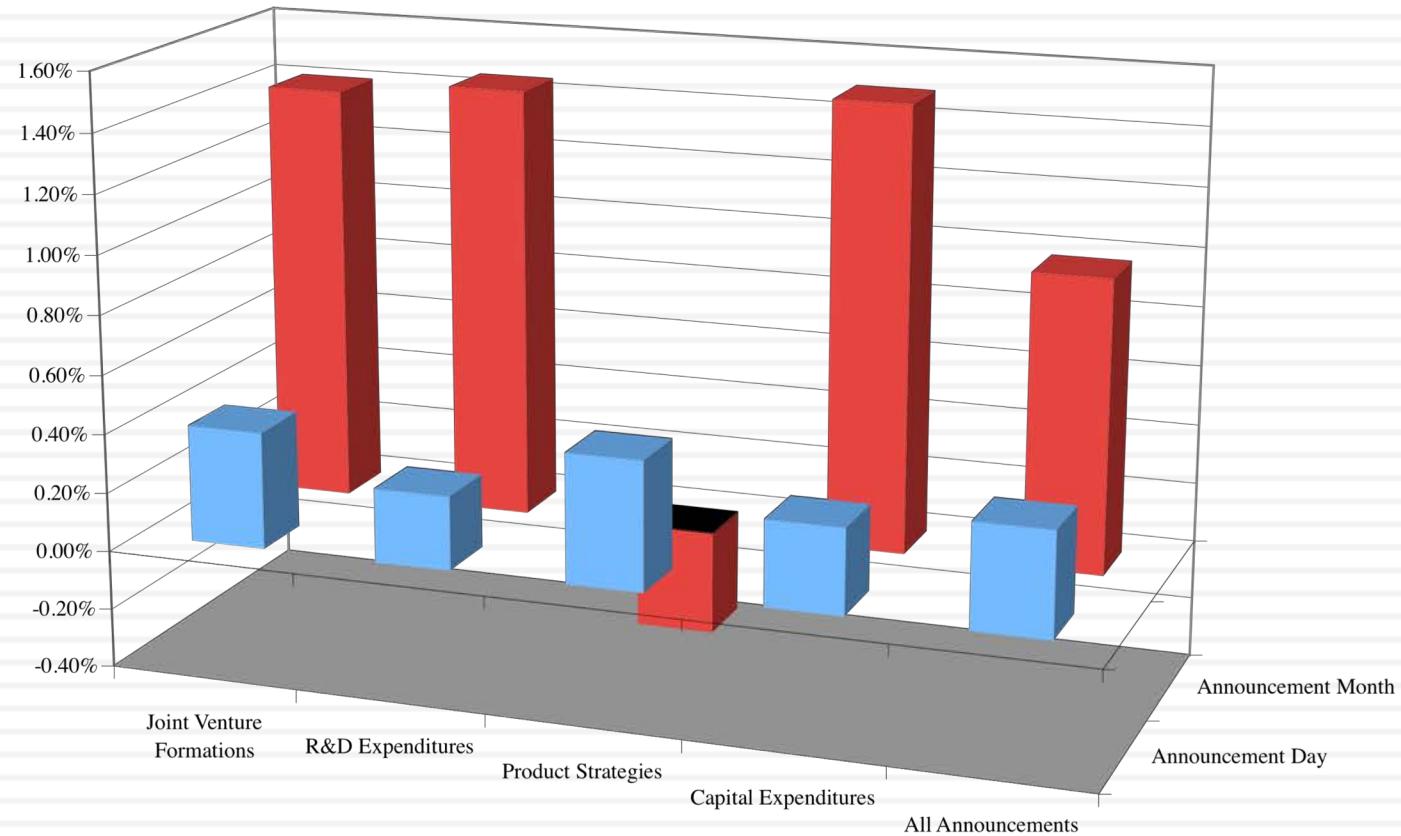
39

- Value of young firms: There are hundreds of start-up and small firms, with no earnings expected in the near future, that raise money on financial markets. Why would a myopic market that cares only about short term earnings attach high prices to these firms?
- Current earnings vs Future growth: If the evidence suggests anything, it is that markets do not value current earnings and cashflows enough and value future earnings and cashflows too much. After all, studies suggest that low PE stocks are under priced relative to high PE stocks
- Market reaction to investments: The market response to research and development and investment expenditures is generally positive.

If markets are so short term, why do they react to big investments (that potentially lower short term earnings) so positively?

40

Market Reaction to Investment Announcements



But what about market crises?

41

- Markets are the problem: Many critics of markets point to market bubbles and crises as evidence that markets do not work. For instance, the market turmoil between September and December 2008 is pointed to as backing for the statement that free markets are the source of the problem and not the solution.
- The counter: There are two counter arguments that can be offered:
 - ▣ The events of the last quarter of 2008 illustrate that we are more dependent on functioning, liquid markets, with risk taking investors, than ever before in history. As we saw, no government or other entity (bank, Buffett) is big enough to step in and save the day.
 - ▣ The firms that caused the market collapse (banks, investment banks) were among the most regulated businesses in the market place. If anything, their failures can be traced to their attempts to take advantage of regulatory loopholes (badly designed insurance programs... capital measurements that miss risky assets, especially derivatives)

IV. Firms and Society

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- In theory: All costs and benefits associated with a firm's decisions can be traced back to the firm.
- In practice: Financial decisions can create social costs and benefits.
 - ▣ A social cost or benefit is a cost or benefit that accrues to society as a whole and not to the firm making the decision.
 - Environmental costs (pollution, health costs, etc..)
 - Quality of Life' costs (traffic, housing, safety, etc.)
 - ▣ Examples of social benefits include:
 - creating employment in areas with high unemployment
 - supporting development in inner cities
 - creating access to goods in areas where such access does not exist

Social Costs and Benefits are difficult to quantify because ..

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- Cannot know the unknown: They might not be known at the time of the decision. In other words, a firm may think that it is delivering a product that enhances society, at the time it delivers the product but discover afterwards that there are very large costs. (Asbestos was a wonderful product, when it was devised, light and easy to work with... It is only after decades that the health consequences came to light)
- Eyes of the beholder: They are ‘person-specific’, since different decision makers can look at the same social cost and weight them very differently.
- Decision paralysis: They can be paralyzing if carried to extremes.

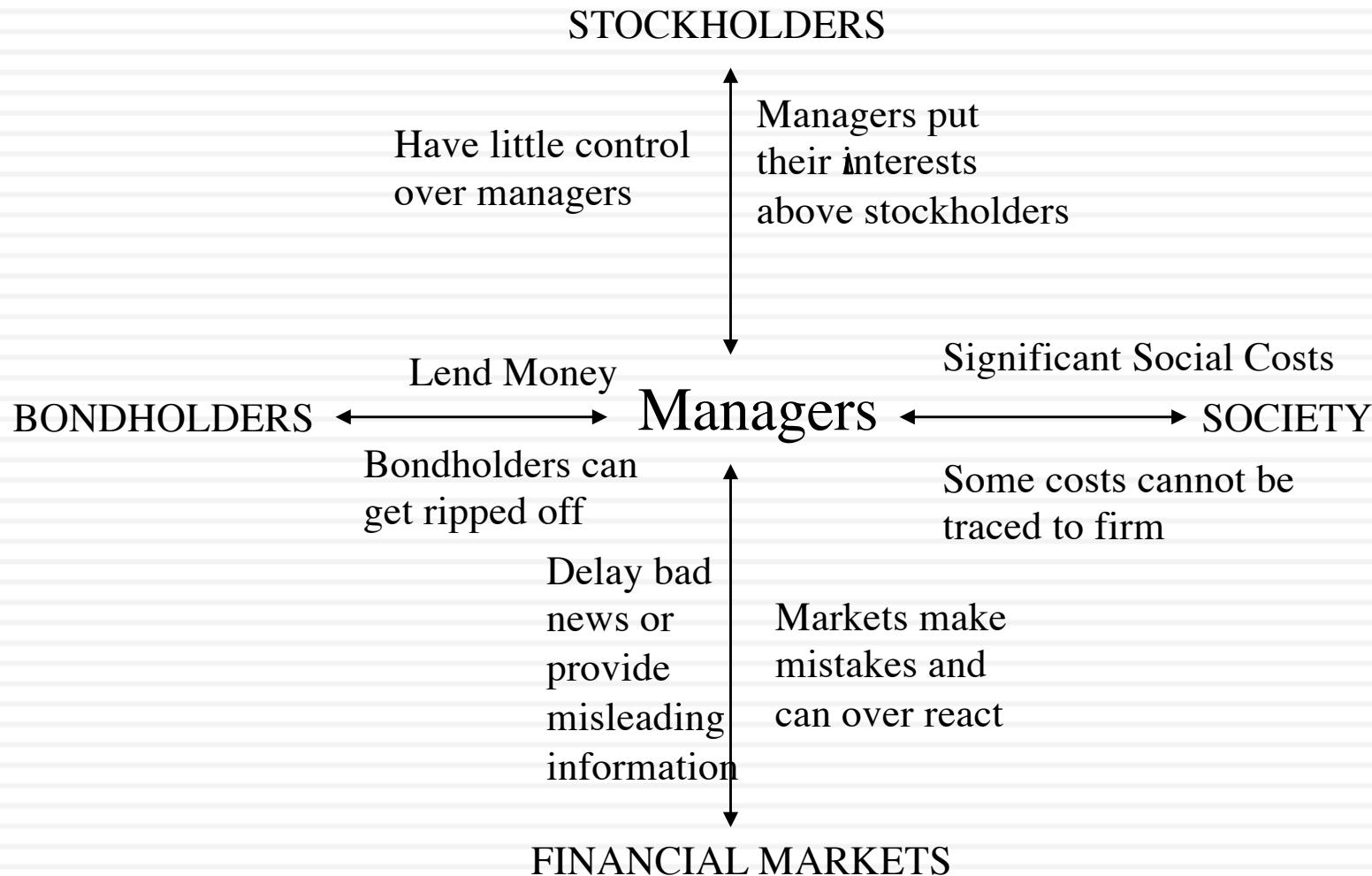
A test of your social consciousness: Put your money where your mouth is...

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- Assume that you work for Disney and that you have an opportunity to open a store in an inner-city neighborhood. The store is expected to lose about a million dollars a year, but it will create much-needed employment in the area, and may help revitalize it.
- Would you open the store?
 - Yes
 - No
- If yes, would you tell your stockholders and let them vote on the issue?
 - Yes
 - No
- If no, how would you respond to a stockholder query on why you were not living up to your social responsibilities?

So this is what can go wrong...

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Traditional corporate financial theory breaks down when ...

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- Managerial self-interest: The interests/objectives of the decision makers in the firm conflict with the interests of stockholders.
- Unprotected debt holders: Bondholders (Lenders) are not protected against expropriation by stockholders.
- Inefficient markets: Financial markets do not operate efficiently, and stock prices do not reflect the underlying value of the firm.
- Large social side costs: Significant social costs can be created as a by-product of stock price maximization.

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

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

I. An Alternative Corporate Governance System

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- Germany and Japan developed a different mechanism for corporate governance, based upon corporate cross holdings.
 - In Germany, the banks form the core of this system.
 - In Japan, it is the keiretsus
 - Other Asian countries have modeled their system after Japan, with family companies forming the core of the new corporate families
- At their best, the most efficient firms in the group work at bringing the less efficient firms up to par. They provide a corporate welfare system that makes for a more stable corporate structure
- At their worst, the least efficient and poorly run firms in the group pull down the most efficient and best run firms down. The nature of the cross holdings makes it very difficult for outsiders (including investors in these firms) to figure out how well or badly the group is doing.

II. Choose a Different Objective Function

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- Firms can always focus on a different objective function. Examples would include
 - ▣ maximizing earnings
 - ▣ maximizing revenues
 - ▣ maximizing firm size
 - ▣ maximizing market share
 - ▣ maximizing EVA
- The key thing to remember is that these are intermediate objective functions.
 - ▣ To the degree that they are correlated with the long term health and value of the company, they work well.
 - ▣ To the degree that they do not, the firm can end up with a disaster

III. Maximize Stock Price, subject to ..

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- The strength of the stock price maximization objective function is its internal self correction mechanism. Excesses on any of the linkages lead, if unregulated, to counter actions which reduce or eliminate these excesses
- In the context of our discussion,
 - ▣ managers taking advantage of stockholders has led to a much more active market for corporate control.
 - ▣ stockholders taking advantage of bondholders has led to bondholders protecting themselves at the time of the issue.
 - ▣ firms revealing incorrect or delayed information to markets has led to markets becoming more “skeptical” and “punitive”
 - ▣ firms creating social costs has led to more regulations, as well as investor and customer backlashes.

The Stockholder Backlash

51

- Activist Institutional investors have become much more active in monitoring companies that they invest in and demanding changes in the way in which business is done. They have been joined by private equity firms like KKR and Blackstone.
- Activist individuals like Carl Icahn specialize in taking large positions in companies which they feel need to change their ways (Blockbuster, Time Warner, Motorola & Apple) and push for change.
- Vocal stockholders, armed with more information and new powers: At annual meetings, stockholders have taken to expressing their displeasure with incumbent management by voting against their compensation contracts or their board of directors

The Hostile Acquisition Threat

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- The typical target firm in a hostile takeover has
 - ▣ a return on equity almost 5% lower than its peer group
 - ▣ had a stock that has significantly under performed the peer group over the previous 2 years
 - ▣ has managers who hold little or no stock in the firm
- In other words, the best defense against a hostile takeover is to run your firm well and earn good returns for your stockholders
- Conversely, when you do not allow hostile takeovers, this is the firm that you are most likely protecting (and not a well run or well managed firm)

In response, boards are becoming more independent...

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

Disney: Eisner's rise & fall from grace

- In his early years at Disney, Michael Eisner brought about long-delayed changes in the company and put it on the path to being an entertainment giant that it is today. His success allowed him to consolidate power and the boards that he created were increasingly captive ones (see the 1997 board).
- In 1996, Eisner spearheaded the push to buy ABC and the board rubberstamped his decision, as they had with other major decisions. In the years following, the company ran into problems both on its ABC acquisition and on its other operations and stockholders started to get restive, especially as the stock price halved between 1998 and 2002.
- In 2003, Roy Disney and Stanley Gold resigned from the Disney board, arguing against Eisner's autocratic style.
- In early 2004, Comcast made a hostile bid for Disney and later in the year, 43% of Disney shareholders withheld their votes for Eisner's reelection to the board of directors. Following that vote, the board of directors at Disney voted unanimously to elect George Mitchell as the Chair of the board, replacing Eisner, who vowed to stay on as CEO.

Eisner's concession: Disney's Board in 2003

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<i>Board Members</i>	<i>Occupation</i>
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.

Changes in corporate governance at Disney

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1. Required at least two executive sessions of the board, without the CEO or other members of management present, each year.
2. Created the position of non-management presiding director, and appointed Senator George Mitchell to lead those executive sessions and assist in setting the work agenda of the board.
3. Adopted a new and more rigorous definition of director independence.
4. Required that a substantial majority of the board be comprised of directors meeting the new independence standards.
5. Provided for a reduction in committee size and the rotation of committee and chairmanship assignments among independent directors.
6. Added new provisions for management succession planning and evaluations of both management and board performance
7. Provided for enhanced continuing education and training for board members.

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

57

<i>Board Members</i>	<i>Occupation</i>
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

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

1. In 2011, Iger announced his intent to step down as CEO in 2015 to allow a successor to be groomed.
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. 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's non-exit and the Domino effect

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1. In 2015 but Disney's board convinced Iger to stay on as CEO for an extra year, for the "the good of the company".
 2. In 2016, Thomas Staggs who was considered heir apparent to Iger left Disney. Others who were considered potential CEOs also left.
 3. In 2017, Disney acquired Fox and announced that Iger's term would be extended to 2019 (and perhaps beyond) because his stewardship was essential for the merger to work.
- Now, what?

What about legislation?

60

- Every corporate scandal creates impetus for a legislative response. The scandals at Enron and WorldCom laid the groundwork for Sarbanes-Oxley.
- You cannot legislate good corporate governance.
 - ▣ The costs of meeting legal requirements often exceed the benefits
 - ▣ Laws always have unintended consequences
 - ▣ In general, laws tend to be blunderbusses that penalize good companies more than they punish the bad companies.

Is there a payoff to better corporate governance?

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- In the most comprehensive study of the effect of corporate governance on value, a governance index was created for each of 1500 firms based upon 24 distinct corporate governance provisions.
 - ▣ Buying stocks that had the strongest investor protections while simultaneously selling shares with the weakest protections generated an annual excess return of 8.5%.
 - ▣ Every one point increase in the index towards fewer investor protections decreased market value by 8.9% in 1999
 - ▣ Firms that scored high in investor protections also had higher profits, higher sales growth and made fewer acquisitions.
- The link between the composition of the board of directors and firm value is weak. Smaller boards do tend to be more effective.
- On a purely anecdotal basis, a common theme at problem companies and is an ineffective board that fails to ask tough questions of an imperial CEO.

The Bondholders' Defense Against Stockholder Excesses

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- More restrictive covenants on investment, financing and dividend policy have been incorporated into both private lending agreements and into bond issues, to prevent future “Nabiscos”.
- New types of bonds have been created to explicitly protect bondholders against sudden increases in leverage or other actions that increase lender risk substantially. Two examples of such bonds
 - Puttable Bonds, where the bondholder can put the bond back to the firm and get face value, if the firm takes actions that hurt bondholders
 - Ratings Sensitive Notes, where the interest rate on the notes adjusts to that appropriate for the rating of the firm
- More hybrid bonds (with an equity component, usually in the form of a conversion option or warrant) have been used. This allows bondholders to become equity investors, if they feel it is in their best interests to do so.

The Financial Market Response

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- While analysts are more likely still to issue buy rather than sell recommendations, the payoff to uncovering negative news about a firm is large enough that such news is eagerly sought and quickly revealed (at least to a limited group of investors).
- As investor access to information improves, it is becoming much more difficult for firms to control when and how information gets out to markets.
- As option trading has become more common, it has become much easier to trade on bad news. In the process, it is revealed to the rest of the market.
- When firms mislead markets, the punishment is not only quick but it is savage.

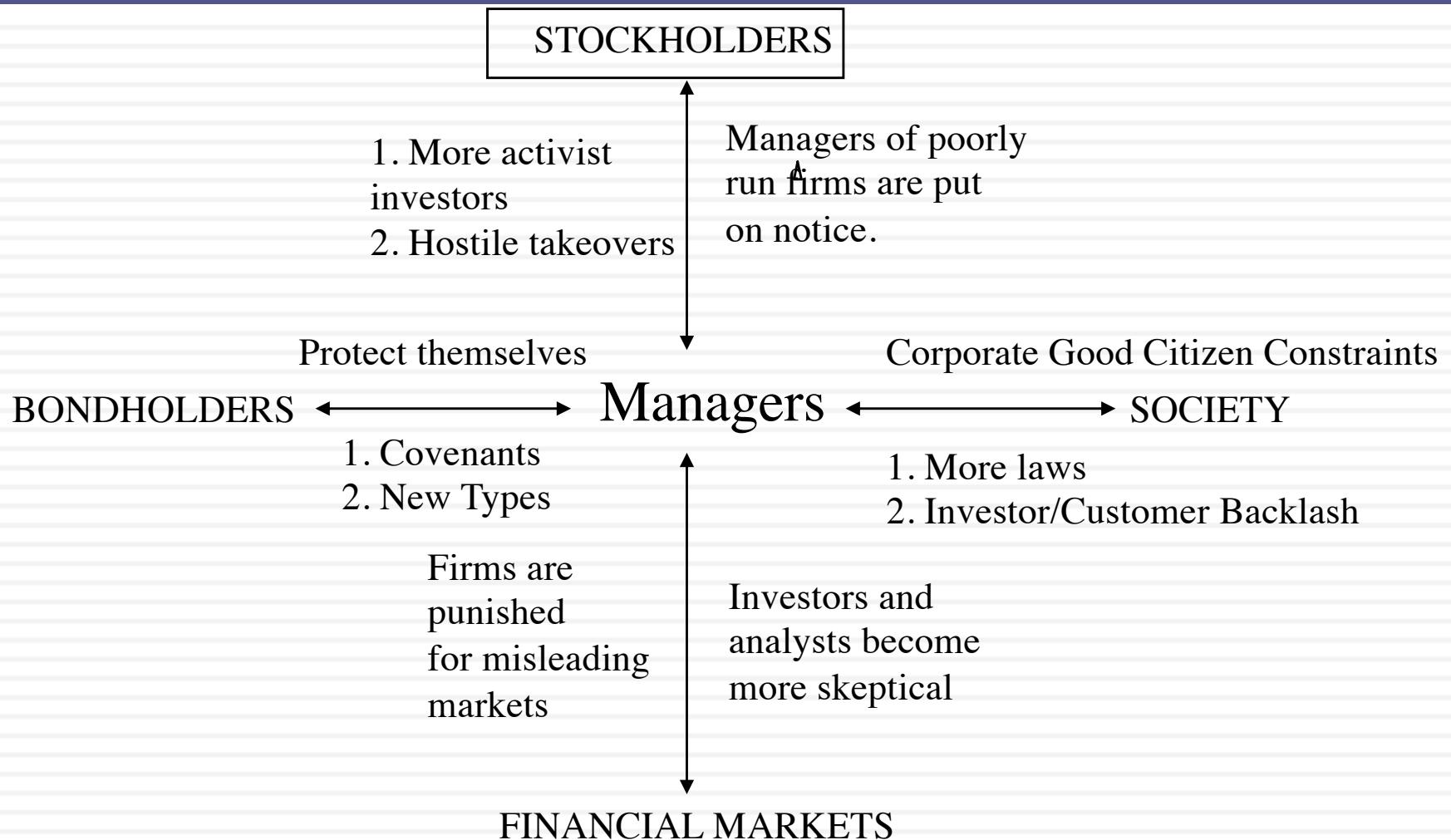
The Societal Response

64

- If firms consistently flout societal norms and create large social costs, the governmental response (especially in a democracy) is for laws and regulations to be passed against such behavior.
- For firms catering to a more socially conscious clientele, the failure to meet societal norms (even if it is legal) can lead to loss of business and value.
- Finally, investors may choose not to invest in stocks of firms that they view as socially irresponsible.

The Counter Reaction

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So what do you think?

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- At this point in time, the following statement best describes where I stand in terms of the right objective function for decision making in a business
 - a. Maximize stock price, with no constraints
 - b. Maximize stock price, with constraints on being a good social citizen.
 - c. Maximize stockholder wealth, with good citizen constraints, and hope/pray that the market catches up with you.
 - d. Maximize profits or profitability
 - e. Maximize earnings growth
 - f. Maximize market share
 - g. Maximize revenues
 - h. Maximize social good
 - i. None of the above

The Modified Objective Function

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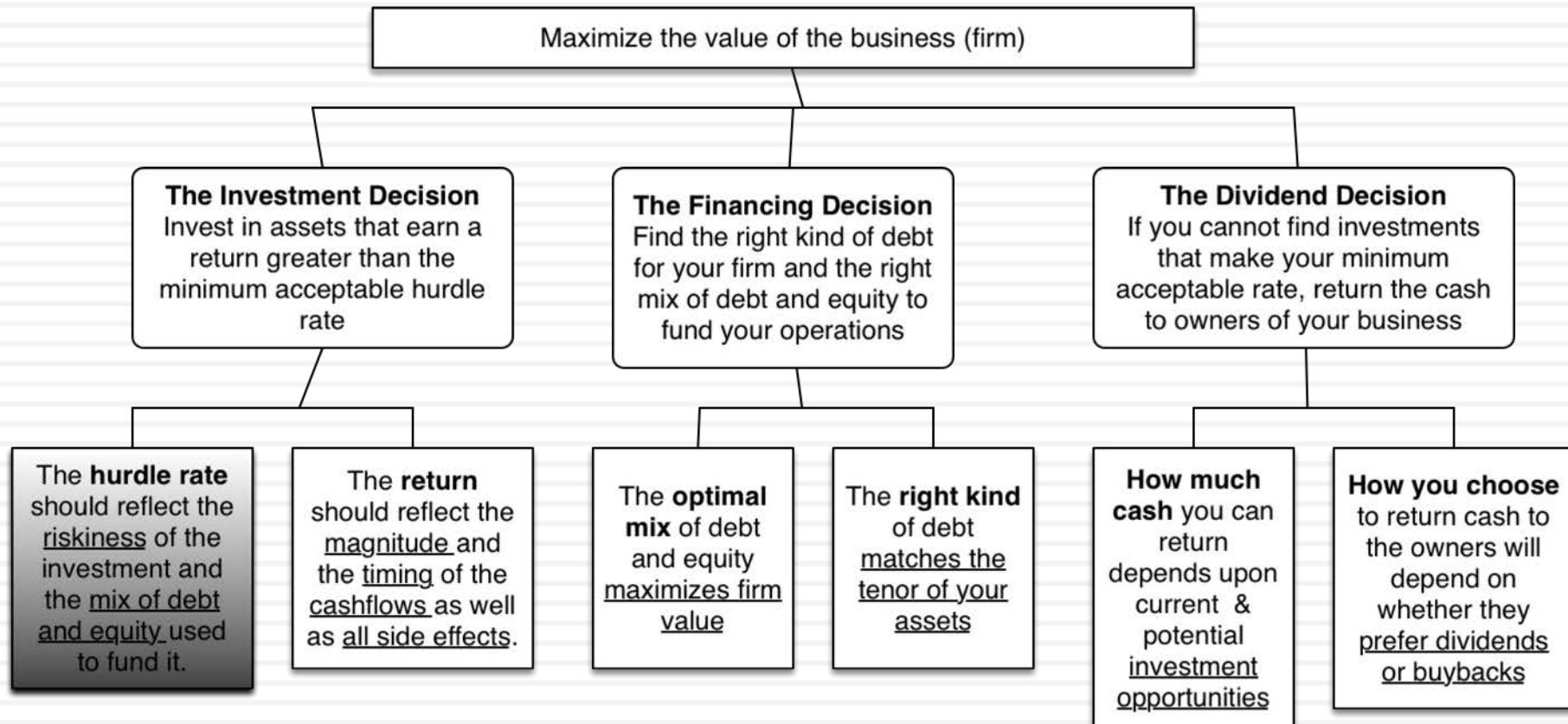
- For publicly traded firms in reasonably efficient markets, where bondholders (lenders) are protected:
 - ▣ Maximize Stock Price: This will also maximize firm value
- For publicly traded firms in inefficient markets, where bondholders are protected:
 - ▣ Maximize stockholder wealth: This will also maximize firm value, but might not maximize the stock price
- For publicly traded firms in inefficient markets, where bondholders are not fully protected
 - ▣ Maximize firm value, though stockholder wealth and stock prices may not be maximized at the same point.
- For private firms, maximize stockholder wealth (if lenders are protected) or firm value (if they are not)

THE INVESTMENT PRINCIPLE: RISK AND RETURN MODELS

“You cannot swing upon a rope that is attached only to your own belt.”

First Principles

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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?

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.

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.

The Capital Asset Pricing Model

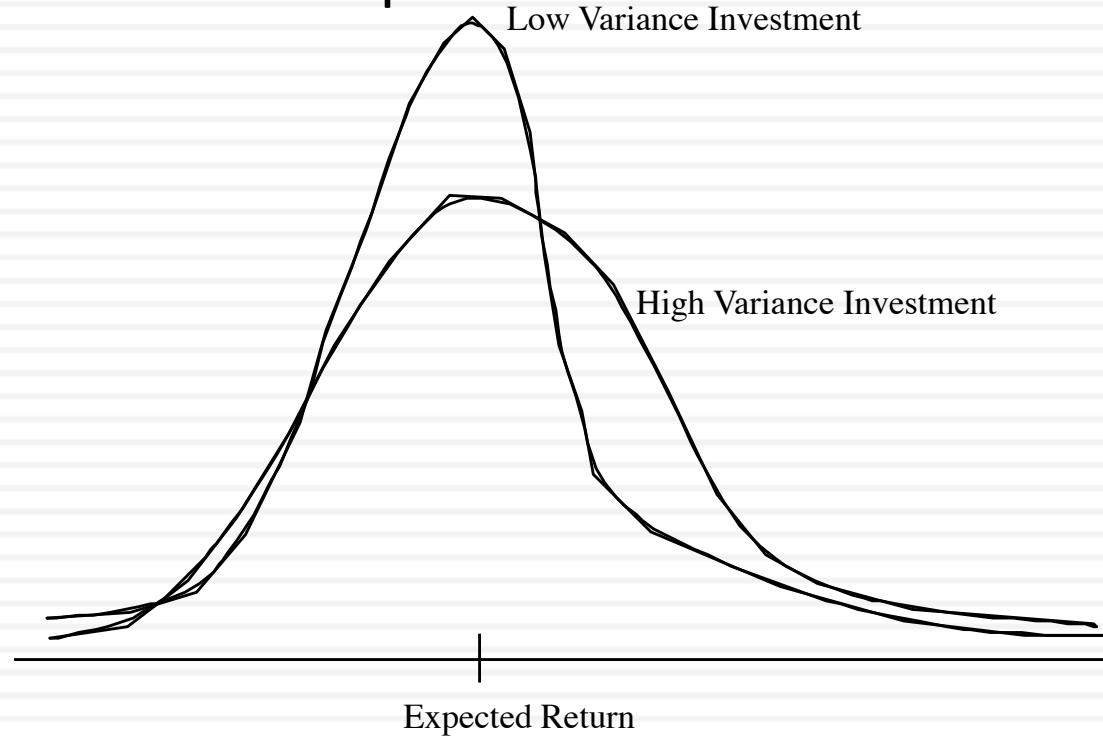
73

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 -
$$\text{Expected Return} = \text{Riskfree rate} + \text{Beta} * \text{Risk Premium}$$
5. Works as well as the next best alternative in most cases.

1. The Mean-Variance Framework

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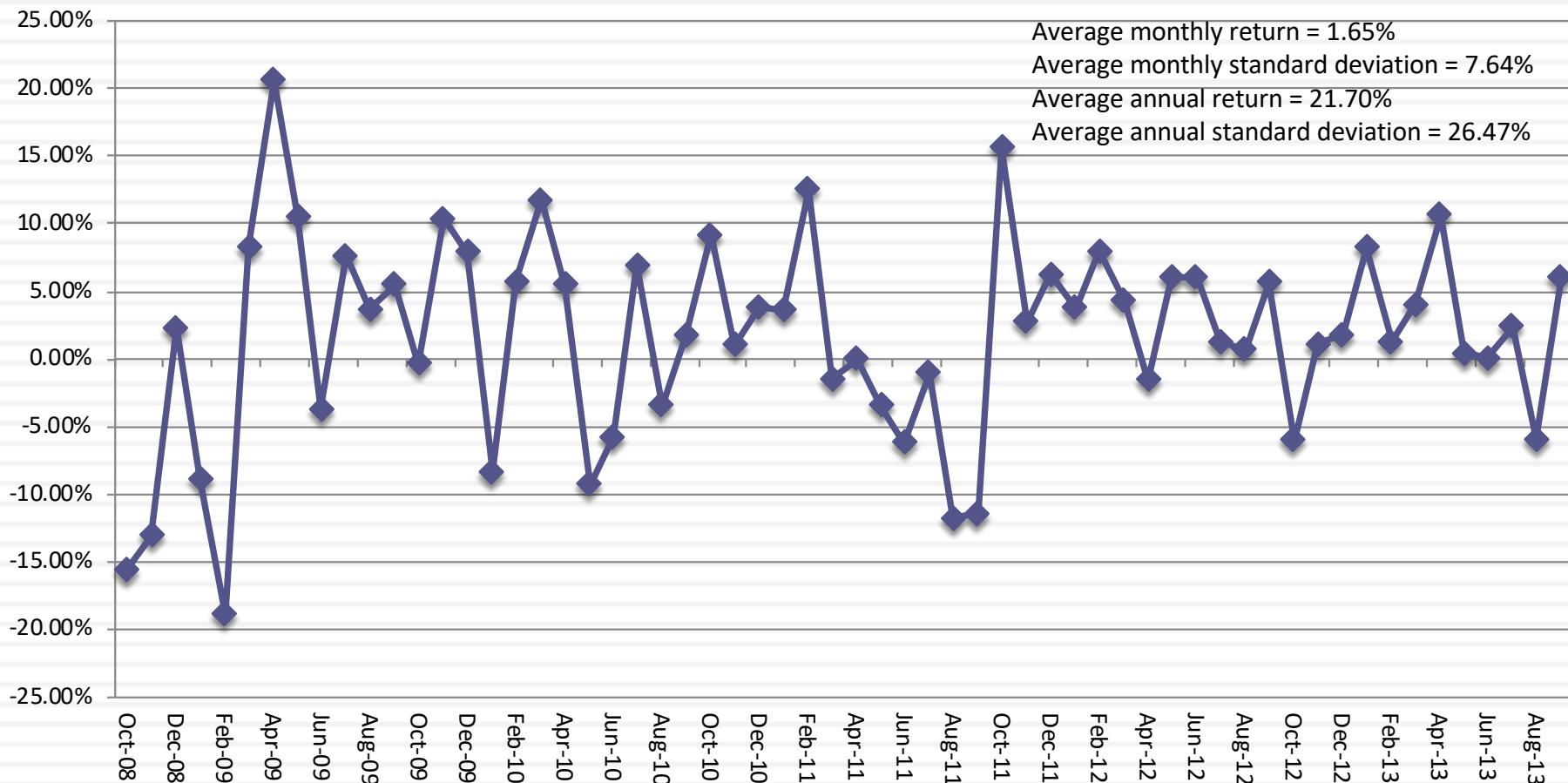
- The variance on any investment measures the disparity between actual and expected returns.



How risky is Disney? A look at the past...

75

Returns on Disney - 2008-2013



Do you live in a mean-variance world?

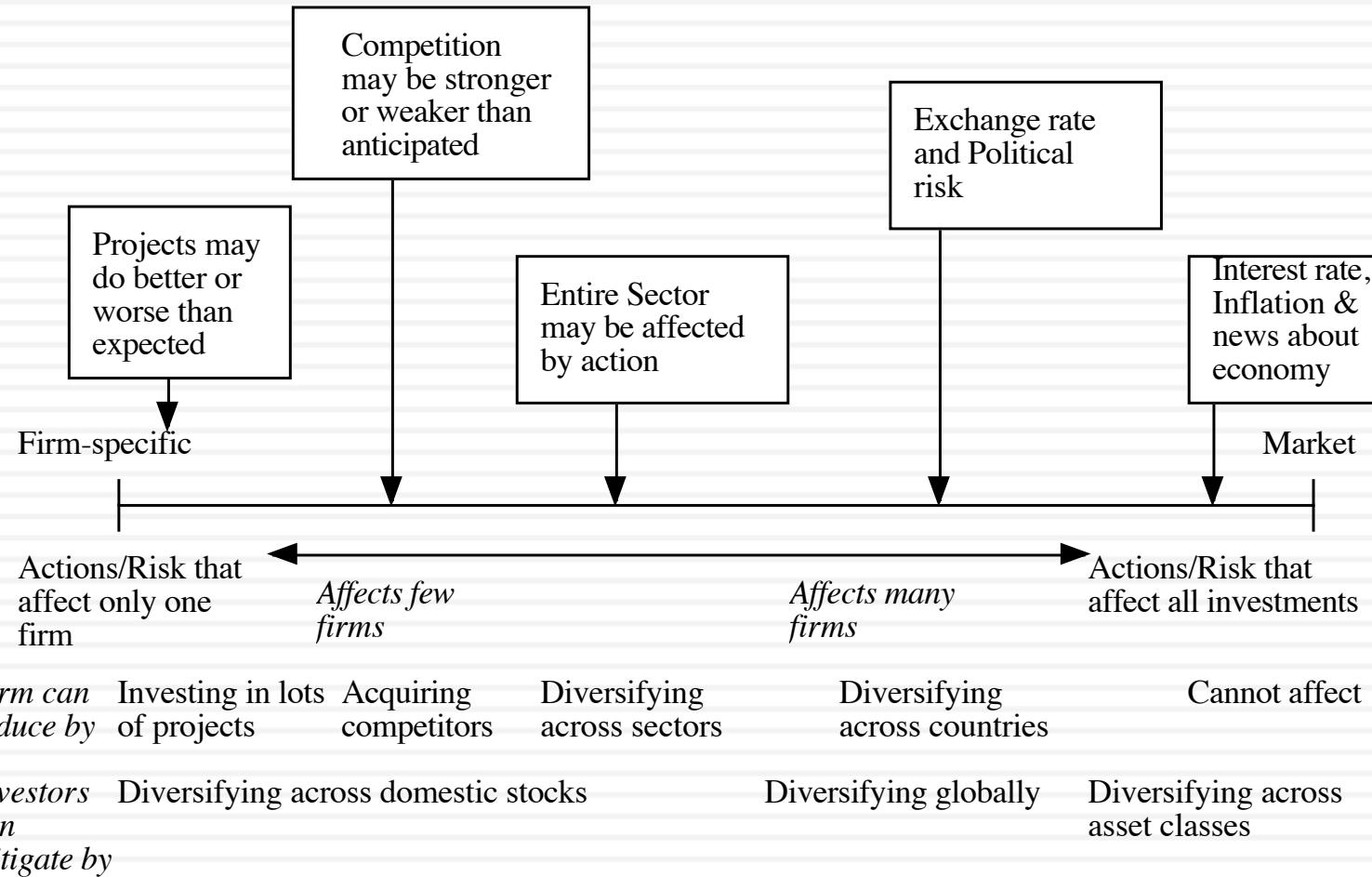
76

- 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%?

The Importance of Diversification: Risk Types

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Figure 3.5: A Break Down of Risk



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 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.**

Identifying the Marginal Investor in your firm...

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<i>Percent of Stock held by Institutions</i>	<i>Percent of Stock held by Insiders</i>	<i>Marginal Investor</i>
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

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 3) Saved Search 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 TRU	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 CORPORATION	NORTHERN 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 CORP	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 LLC	DAVIS SELECTED ADVISE	13F		12,938.299	0.72	-2,546,616	06/30/13
18. ■■■■■GEODE CAPITAL MANAGEMENT	GEODE CAPITAL MANAGE	13F		12,441.353	0.70	233,702	06/30/13

Loading % Out 79.75 Zoom - + 100% 100%

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.

	<i>Disney</i>	<i>Deutsche Bank</i>	<i>Vale (preferred)</i>	<i>Tata Motors</i>	<i>Baidu (Class A)</i>
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%

<i>Company</i>	<i>Largest holder</i>	<i>Number of institutional investors in top ten holdings</i>
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

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

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)

Limitations of the CAPM

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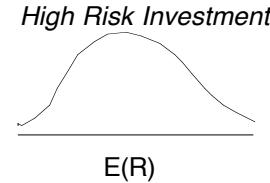
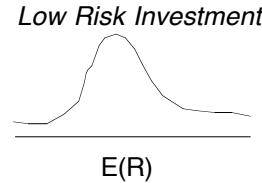
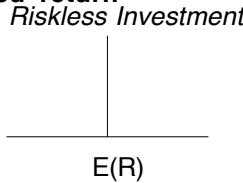
1. The model makes unrealistic assumptions
2. The parameters of the model cannot be estimated precisely
 - ▣ The market index used can be wrong.
 - ▣ The firm may have changed during the 'estimation' period'
3. The model does not work well
 - ▣ - If the model is right, there should be:
 - A linear relationship 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.

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

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

Risk that affects all investments (Market Risk)

Cannot be diversified away since most assets are affected by it.

Step 3: Measuring Market Risk

The CAPM

If there is

1. no private information
2. no transactions cost

the optimal diversified portfolio includes every traded asset. Everyone will hold this market portfolio

Market Risk = Risk added by any investment to the market portfolio:

The APM

If there are no arbitrage opportunities then the market risk of any asset must be captured by betas relative to factors that affect all investments.

Market Risk = Risk exposures of any asset to market factors

Multi-Factor Models

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.

Proxy Models

In an efficient market, differences in returns across long periods must be due to market risk differences. Looking for variables correlated with returns should then give us proxies for this risk.

Market Risk = Captured by the Proxy Variable(s)

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

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)

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.

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

88

- 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

From Risk & Return Models to Hurdle Rates: Estimation Challenges

“The price of purity is purists...”

Anonymous

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.

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.

Riskfree Rate in Practice

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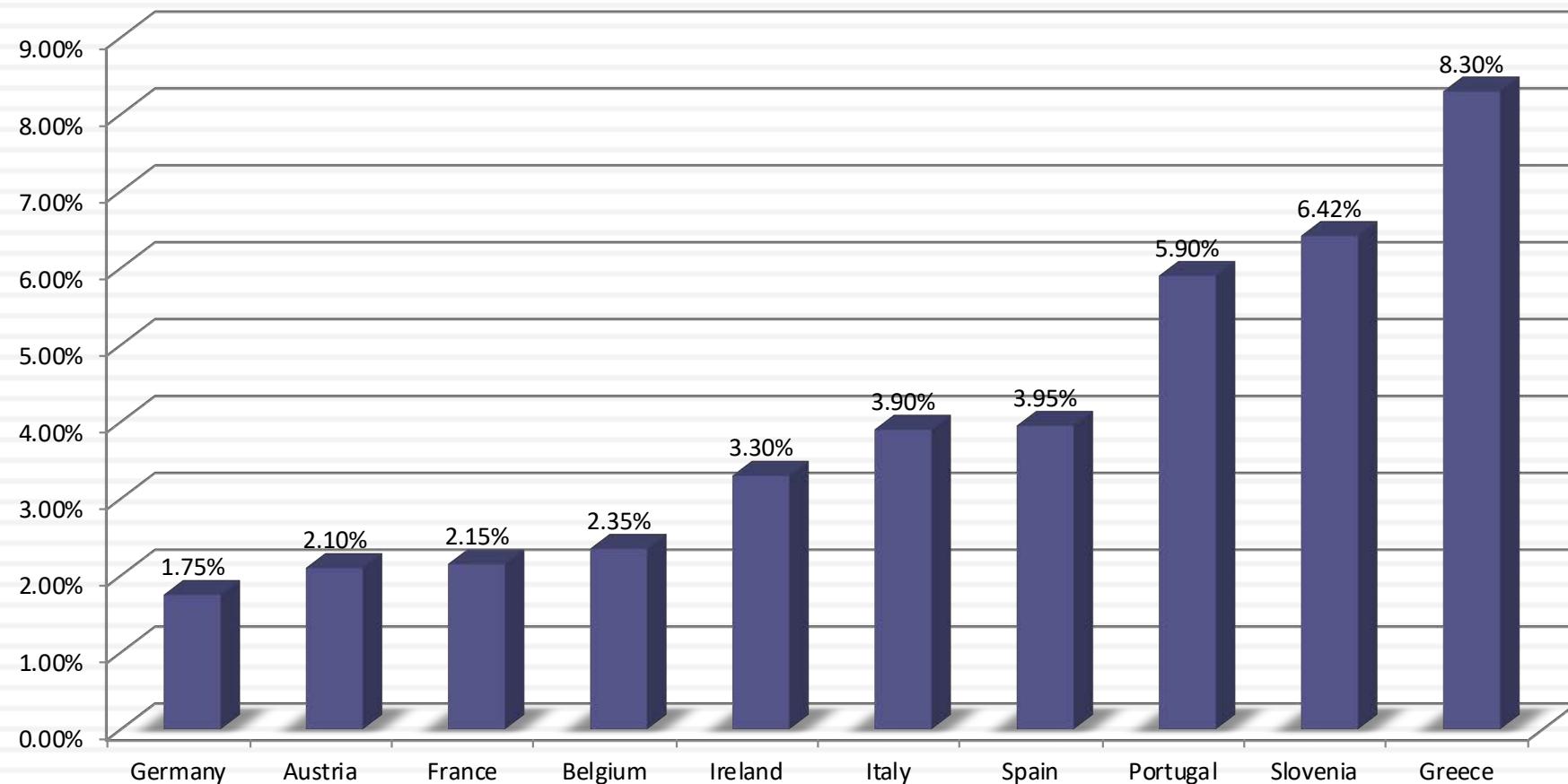
- Definition: The riskfree rate is the rate on a zero coupon default-free bond matching the time horizon of the cash flow being analyzed.
- Implication: Theoretically, this translates into using different riskfree rates for each cash flow - the 1 year zero coupon rate for the cash flow in year 1, the 2-year zero coupon rate for the cash flow in year 2 ...
- A Practical Solution: 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.
- **In corporate finance, almost everything we do is long term. So, using a long term default free rate as the risk free rate makes sense.**

The Bottom Line on Riskfree Rates

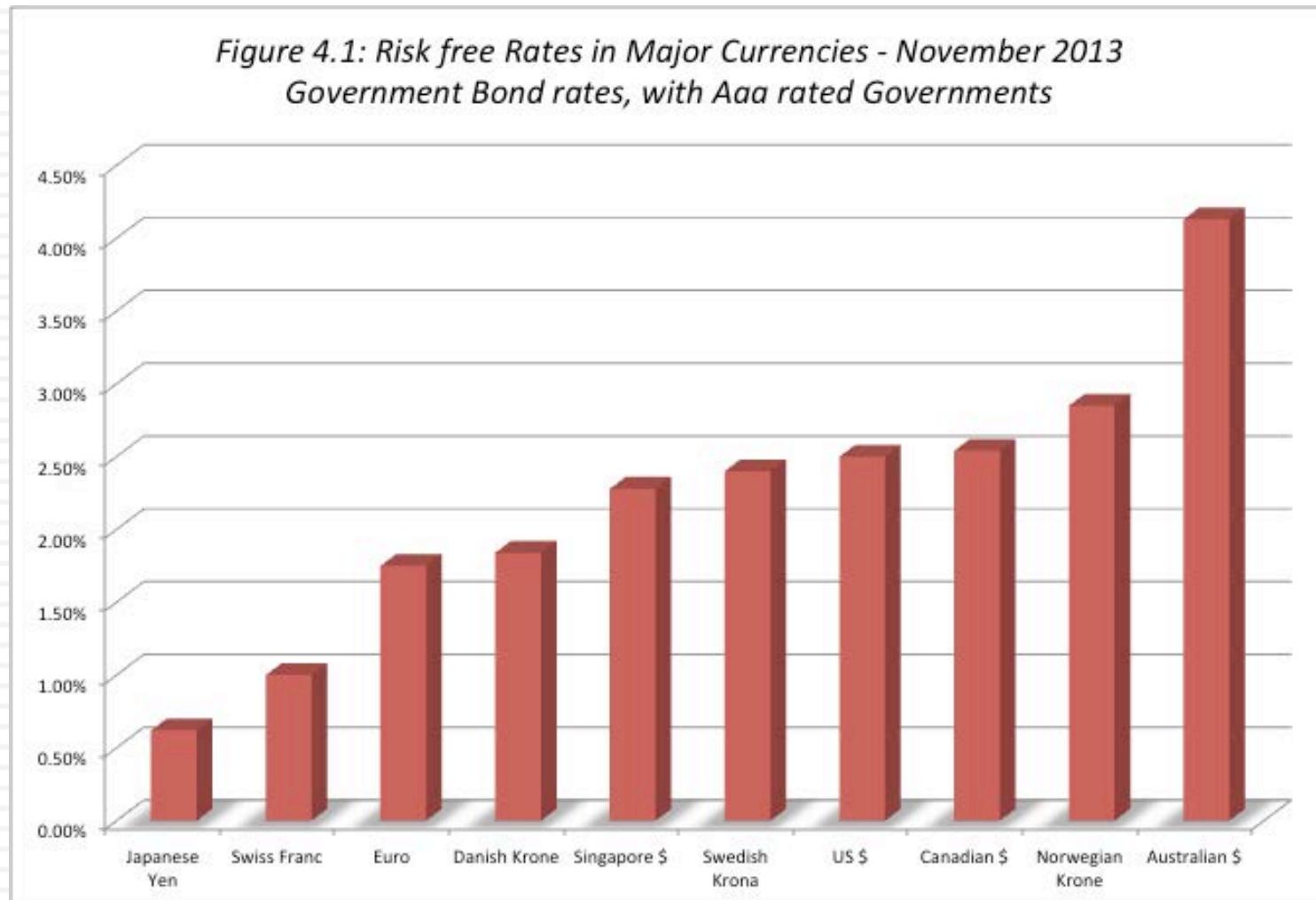
- **Currency Matching:** The riskfree rate that you use in an analysis should be in the same currency that your cashflows are estimated in.
 - ▣ In other words, if your cashflows are in U.S. dollars, your riskfree rate has to be in U.S. dollars as well.
 - ▣ If your cash flows are in Euros, your riskfree rate should be a Euro riskfree rate.
- **Just use the government bond 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.
- **If the government is default-free**, using a long term government rate (even on a coupon bond) as the risk free 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.

What is the Euro riskfree rate? An exercise in November 2013

Rate on 10-year Euro Government Bonds: November 2013



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



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 Renmimbi government bond rate was 4.30% and the local currency rating was Aa3, with a default spread of 0.8%.
Riskfree rate in Chinese Renmimbi = $4.30\% - 0.8\% = 3.5\%$
- **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.

Three paths to estimating sovereign default spreads

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- ❑ Sovereign dollar or euro denominated bonds: The difference between the interest rate on a sovereign US \$ bond, issued by the country, and the US treasury bond rate can be used as the default spread. For example, in November 2013, the 10-year Brazil US \$ bond, denominated in US dollars had a yield of 4.25% and the US 10-year T.Bond rate traded at 2.75%.

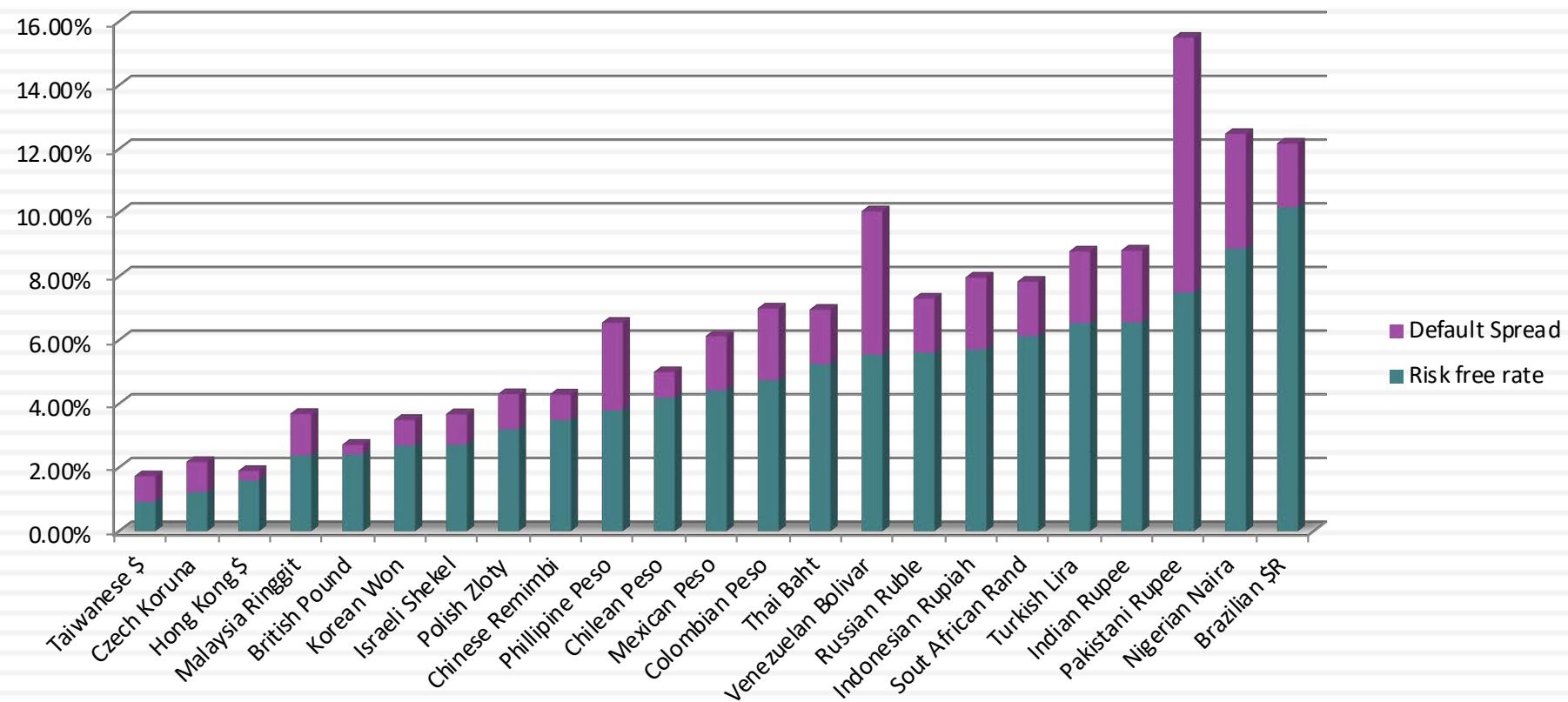
$$\text{Default spread} = 4.25\% - 2.75\% = 1.50\%$$

- ❑ CDS spreads: Obtain the default spreads for sovereigns in the CDS market. The CDS spread for Brazil in November 2013 was 2.50%.
- ❑ Average spread: If you know the sovereign rating for a country, you can estimate the default spread based on the rating. In November 2013, Brazil's rating was Baa2, yielding a default spread of 2%.

Risk free rates in currencies: Sovereigns with default risk in November 2013

98

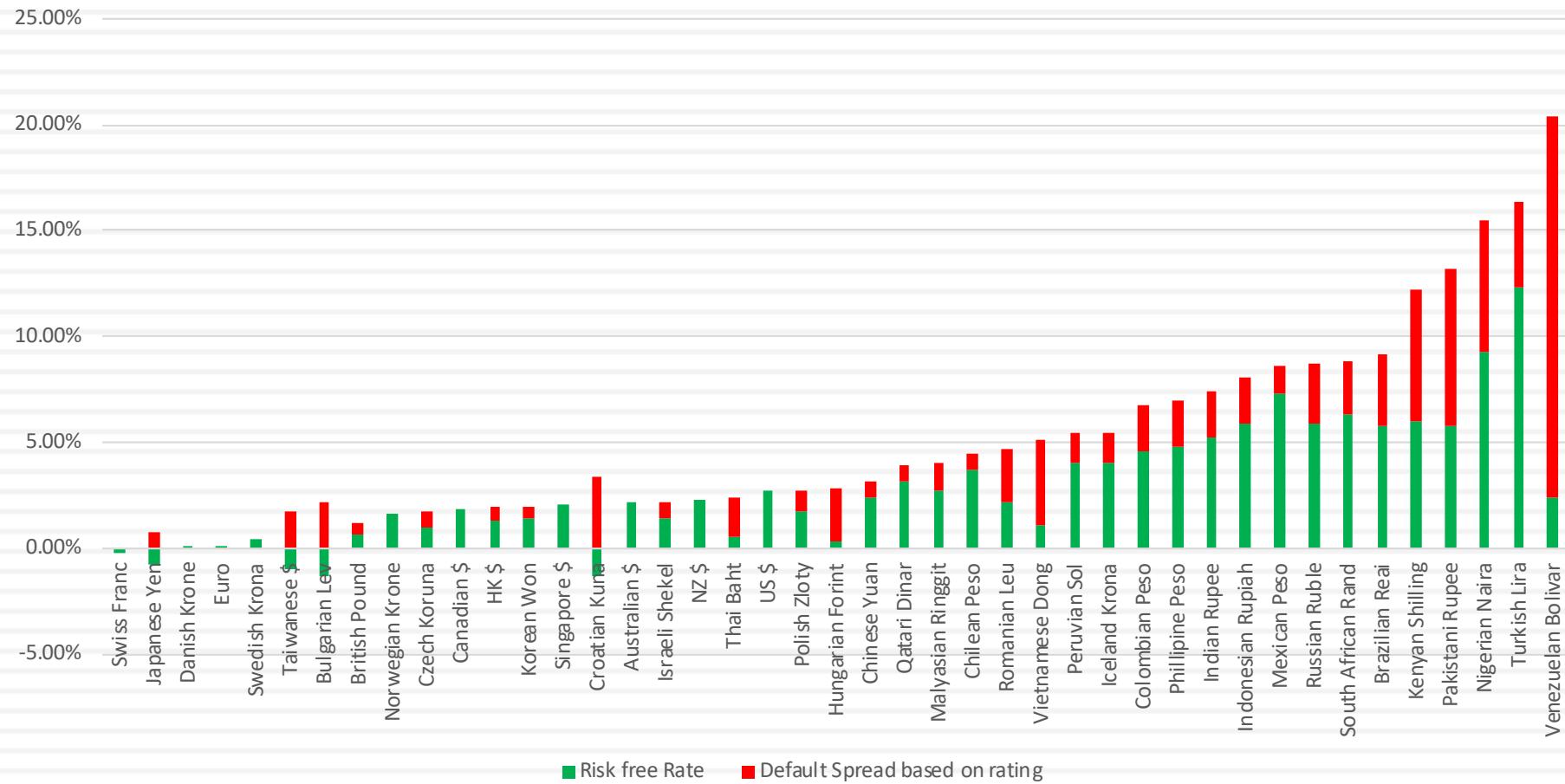
Figure 4.2: Risk free rates in Currencies where Governments not Aaa rated



Risk free Rates in January 2019

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Risk Free Rates in Currencies in January 2019: Government Bond Based



Measurement of the equity risk premium

100

- The equity 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

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%

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.

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

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.

1. 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.

2. 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.

Historical ERP: A Historical Snapshot

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2018	7.93%	6.26%	6.11%	4.66%
Std Error	2.09%	2.22%		
1969-2018	6.34%	4.00%	5.01%	3.04%
Std Error	2.38%	2.71%		
2009-2018	13.00%	11.21%	12.48%	11.00%
Std Error	3.71%	5.50%		

Historical premium for the US

- If you are going to use a historical risk premium, make it
 - ▣ Long term (because of the standard error)
 - ▣ Consistent with your risk free rate
 - ▣ A “compounded” average
- No matter which estimate you use, recognize that it is backward looking, is noisy and may reflect selection bias.

3. A Forward Looking ERP

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- For a start: The price that investors pay for risky Let's start with a general proposition. If you know the price paid for an asset and have estimates of the expected cash flows on the asset, you can estimate the IRR of these cash flows. If you paid the price, this is what you have priced the asset to earn (as an expected return).
- Stock Price & Risk: If you assume that stocks are correctly priced in the aggregate and you can estimate the expected cashflows from buying stocks, you can estimate the expected rate of return on stocks by finding that discount rate that makes the present value equal to the price paid.
- Implied ERP: Subtracting out the riskfree rate should yield an implied equity risk premium. This implied equity premium is a forward looking number and can be updated as often as you want (every minute of every day, if you are so inclined).

Implied ERP in November 2013: Watch what I pay, not what I say..

- If you can observe what investors are willing to pay for stocks, you can back out an expected return from that price and an implied equity risk premium.

Base year cash flow (last 12 mths)

Dividends (TTM): 33.22
 + Buybacks (TTM): 49.02
 = Cash to investors (TTM): 82.35
 Earnings in TTM:

Expected growth in next 5 years

Top down analyst estimate of earnings growth for S&P 500 with stable payout: 5.59%

E(Cash to investors)

86.96

91.82

96.95

102.38

108.10

S&P 500 on 11/1/13=

1756.54

$$1756.54 = \frac{86.96}{(1+r)} + \frac{91.82}{(1+r)^2} + \frac{96.95}{(1+r)^3} + \frac{102.38}{(1+r)^4} + \frac{108.10}{(1+r)^5} + \frac{110.86}{(r - .0255)(1+r)^5}$$

r = Implied Expected Return on Stocks = 8.04%

Minus

Risk free rate = T.Bond rate on 1/1/14=2.55%

Equals

Implied Equity Risk Premium (1/1/14) = 8.04% - 2.55% = 5.49%

Beyond year 5

Expected growth rate =
 Riskfree rate = 2.55%
 Expected CF in year 6 =
 108.1(1.0255)

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 than 5.5%.

Emerging Market ERP = 5.5% +

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

What about equity risk premiums for other markets?

111

- 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.
- You could try to compute implied equity risk premiums but getting the inputs, especially for long term growth are difficult to do.

One solution: Bond default spreads as CRP

– November 2013

- In November 2013, the equity risk premium for the US was 5.50% 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%	5.50%	7.75%
China	Aa3	0.80%	5.50%	6.30%
Brazil	Baa2	2.00%	5.50%	7.50%

- If you prefer CDS spreads:

Country	Sovereign CDS Spread	US ERP	Total ERP for country
India	4.20%	5.50%	9.70%
China	1.20%	5.50%	6.70%
Brazil	2.59%	5.50%	8.09%

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.

$$\text{Brazil's Equity Risk Premium} = 5.50\% + 2.00\% (21\%/14\%) = 8.50\%$$

- Using the same approach for China and India:

- China's Equity Risk Premium = $5.50\% + 0.80\% (18\%/10\%) = 6.94\%$
- India's Equity Risk Premium = $5.50\% + 2.25\% (24\%/17\%) = 9.10\%$

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 November 2013, my estimate for the implied premium in the US was 5.5%. 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.

ERP: Nov 2013

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

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

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

00%	Albania	12.25%	6.75%
00%	Armenia	10.23%	4.73%
95%	Azerbaijan	8.88%	3.38%
00%	Belarus	15.63%	10.13%
00%	Bosnia	15.63%	10.13%
40%	Bulgaria	8.50%	3.00%
38%	Croatia	9.63%	4.13%
00%	Czech Republic	6.93%	1.43%
00%	Estonia	6.93%	1.43%
00%	Georgia	10.90%	5.40%
38%	Hungary	9.63%	4.13%
45%	Kazakhstan	8.50%	3.00%
22%	Latvia	8.50%	3.00%

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

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

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

Estimating ERP for Disney: November 2013

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

<i>Region/ Country</i>	<i>Proportion of Disney's Revenues</i>	<i>ERP</i>
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%

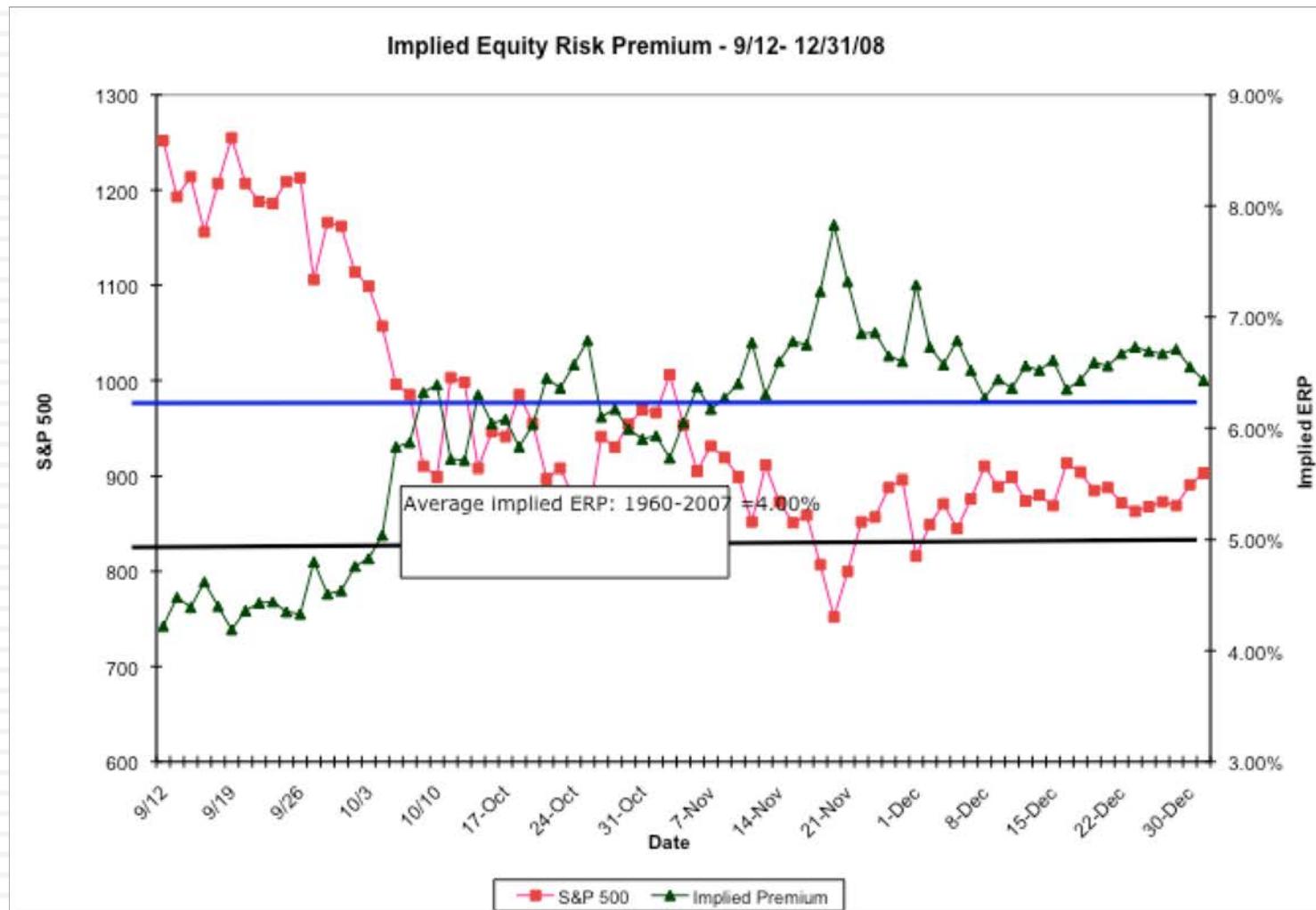
ERP for Companies: November 2013

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

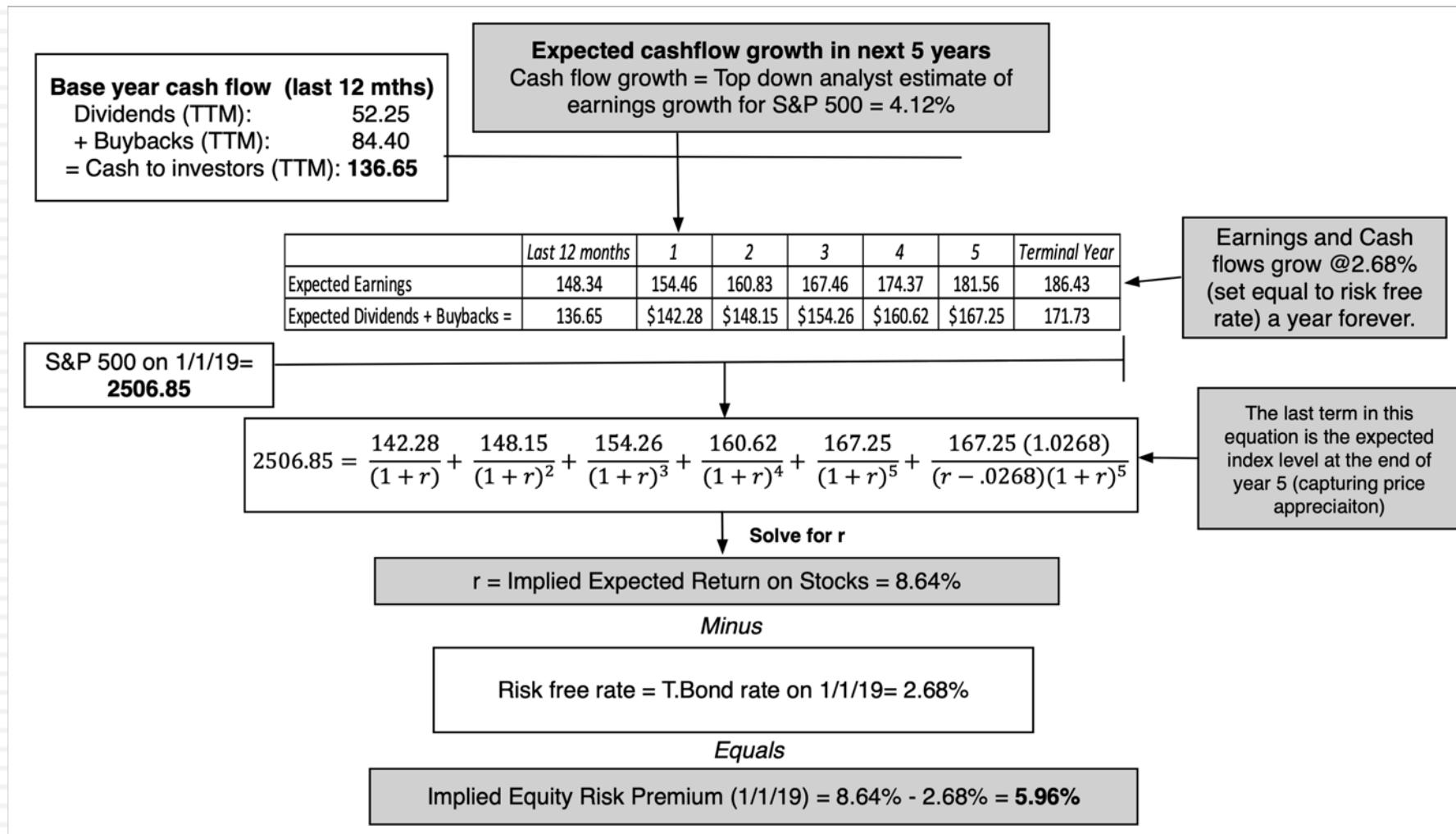
<i>Company</i>	<i>Region/ Country</i>	<i>Weight</i>	<i>ERP</i>
Bookscape	United States	100%	5.50%
	US & Canada	4.90%	5.50%
	Brazil	16.90%	8.50%
	Rest of Latin America	1.70%	10.09%
	China	37.00%	6.94%
	Japan	10.30%	6.70%
	Rest of Asia	8.50%	8.61%
	Europe	17.20%	6.72%
	Rest of World	3.50%	10.06%
	Company	100.00%	7.38%
Vale	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%

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

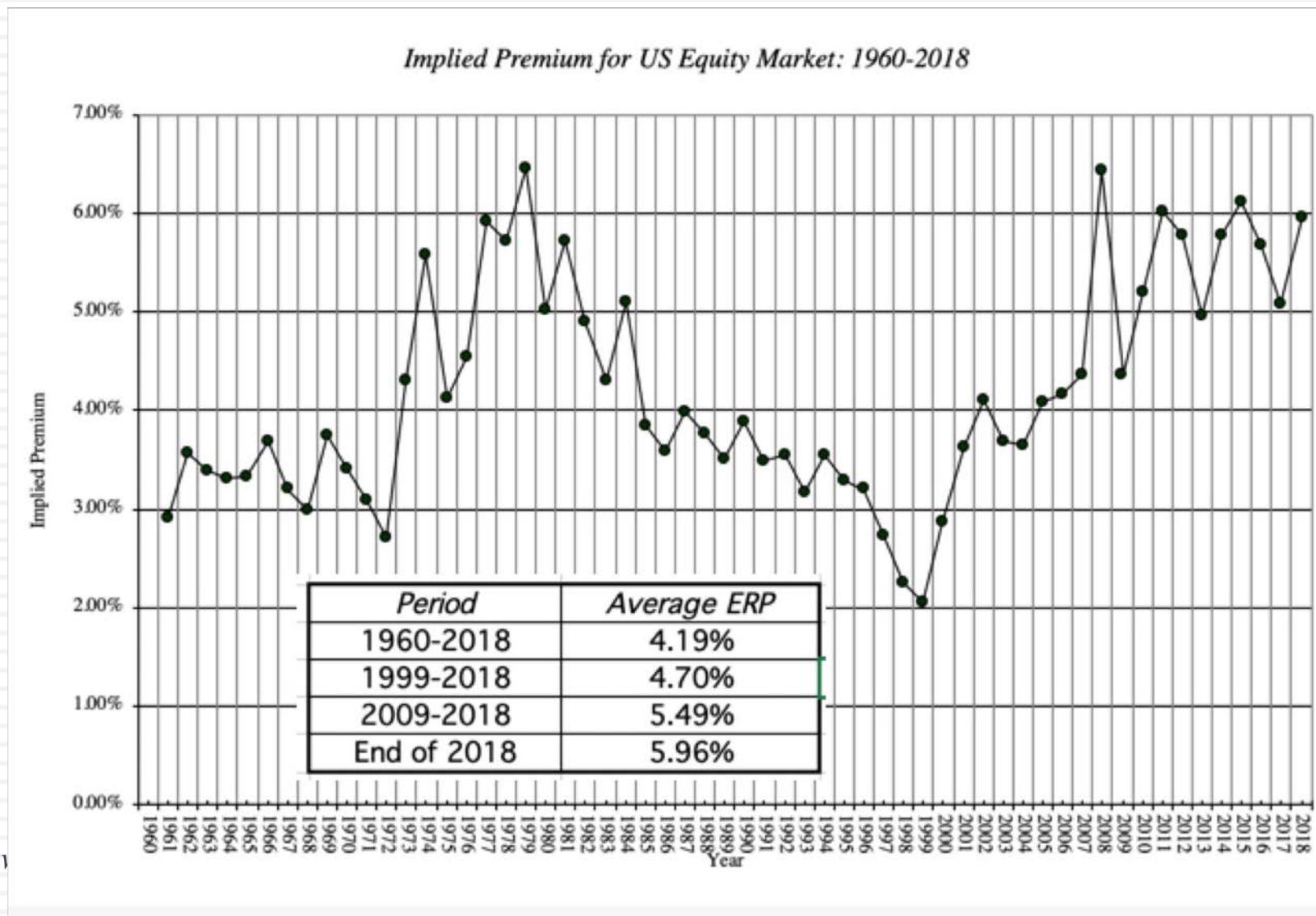
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An Updated Implied ERP

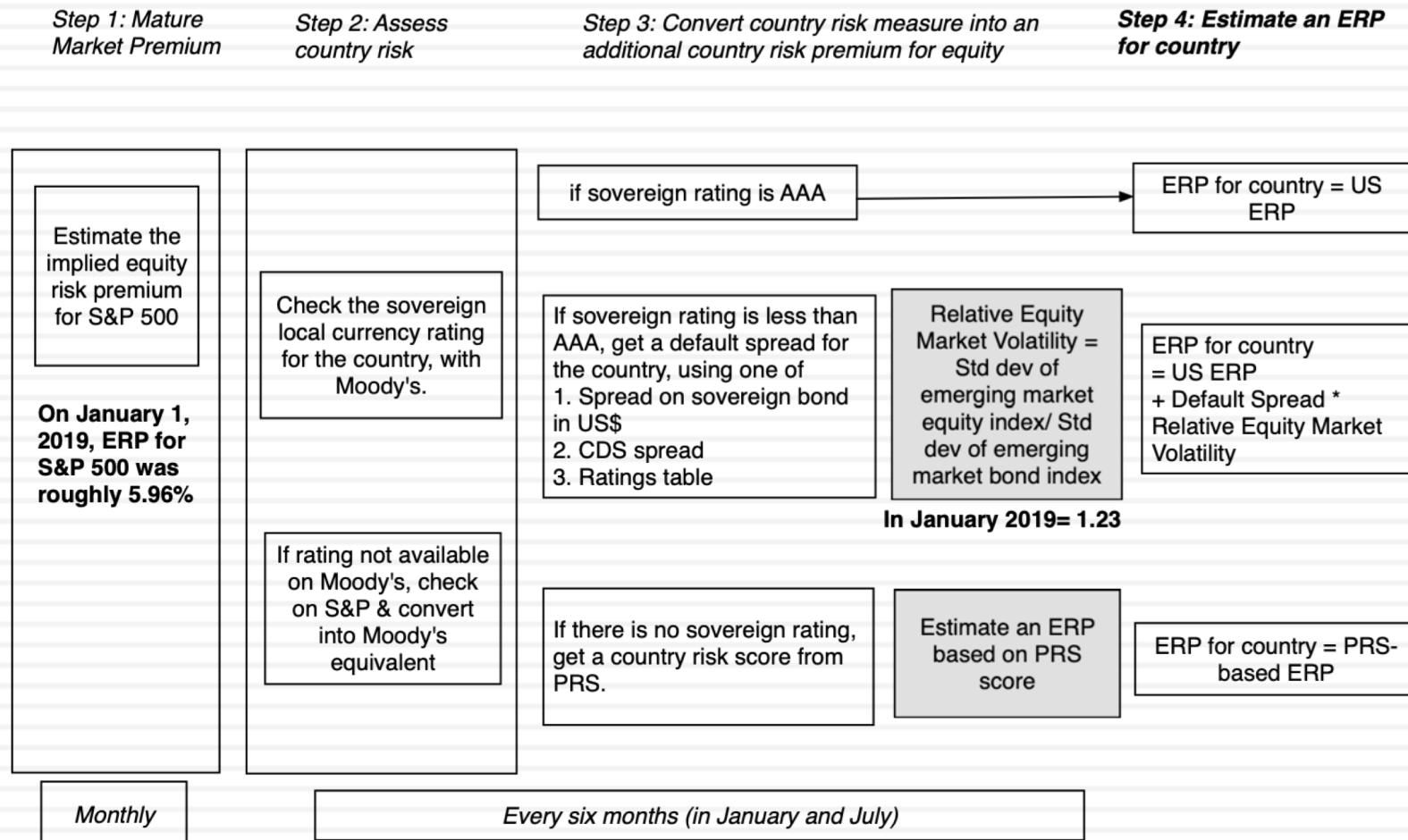


Implied Premiums in the US: 1960-2018



A Composite way of estimating ERP for countries

ERP Estimation Procedure - January 1, 2019



Canada	5.96%	0.00%
United States	5.96%	0.00%
North America	5.96%	0.00%

Caribbean	13.61%	7.65%
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Argentina	13.60%	7.64%
Belize	14.99%	9.03%
Bolivia	10.96%	5.00%
Brazil	10.13%	4.17%
Chile	6.94%	0.98%
Colombia	8.60%	2.64%
Costa Rica	12.21%	6.25%
Ecuador	14.99%	9.03%
El Salvador	16.37%	10.41%
Guatemala	9.43%	3.47%
Honduras	12.21%	6.25%
Mexico	7.63%	1.67%
Nicaragua	13.60%	7.64%
Panama	8.60%	2.64%
Paraguay	9.43%	3.47%
Peru	7.63%	1.67%
Suriname	13.60%	7.64%
Uruguay	8.60%	2.64%
Venezuela	28.10%	22.14%
Central and South America	10.61%	4.65%

Angola	14.99%	9.03%
Benin	12.21%	6.25%
Botswana	7.14%	1.18%
Burkina Faso	13.60%	7.64%
Cameroon	13.60%	7.64%
Cape Verde	13.60%	7.64%
Congo (DR)	14.99%	9.03%
Congo (Rep)	18.46%	12.50%
Côte d'Ivoire	10.96%	5.00%
Egypt	14.99%	9.03%
Ethiopia	12.21%	6.25%
Gabon	16.37%	10.41%
Ghana	14.99%	9.03%
Kenya	13.60%	7.64%
Morocco	9.43%	3.47%
Mozambique	19.83%	13.87%
Namibia	9.43%	3.47%
Nigeria	13.60%	7.64%
Rwanda	13.60%	7.64%
Senegal	10.96%	5.00%
South Africa	9.02%	3.06%
Swaziland	13.60%	7.64%
Tanzania	12.21%	6.25%
Tunisia	13.60%	7.64%
Uganda	13.60%	7.64%
Zambia	16.37%	10.41%
Africa	12.63%	6.67%

Albania	12.21%	6.25%
Armenia	12.21%	6.25%
Azerbaijan	10.13%	4.17%
Belarus	14.99%	9.03%
Bosnia and Herzegovina	14.99%	9.03%
Bulgaria	8.60%	2.64%
Croatia	10.13%	4.17%
Czech Republic	6.94%	0.98%
Estonia	6.94%	0.98%
Georgia	10.13%	4.17%
Hungary	9.02%	3.06%
Kazakhstan	9.02%	3.06%
Kyrgyzstan	13.60%	7.64%
Latvia	7.63%	1.18%
Lithuania	7.63%	1.18%
Macedonia	10.96%	5.00%
Moldova	14.99%	9.03%
Montenegro	12.21%	6.25%
Poland	7.14%	1.18%
Romania	9.02%	3.06%
Russia	9.43%	3.47%
Serbia	10.96%	5.00%
Slovakia	7.14%	1.18%
Slovenia	8.18%	2.22%
Tajikistan	9.43%	3.47%
Ukraine	18.46%	12.50%
Eastern Europe & Russia	9.24%	3.28%

Country	PRS	ERP	CRP	Country	PRS	ERP	CRP
Algeria	65	13.60%	7.64%	Malawi	61	16.37%	10.41%
Brunei	80.5	6.94%	0.98%	Mali	61.3	16.37%	10.41%
Gambia	63.3	14.99%	9.03%	Myanmar	62	16.37%	10.41%
Guinea	54.3	22.61%	16.65%	Niger	54.5	22.61%	16.65%
Guinea-Bissau	62	16.37%	10.41%	Sierra Leone	54.8	22.61%	16.65%
Guyana	66.5	12.21%	6.25%	Somalia	53.5	22.61%	16.65%
Haiti	60	18.46%	12.50%	Sudan	38.8	28.10%	22.14%
Iran	69.3	10.13%	4.17%	Syria	51.8	22.61%	16.65%
Korea, D.P.R.	53	22.61%	16.65%	Togo	61	16.37%	10.41%
Liberia	53.5	22.61%	16.65%	Yemen, Republic	48	28.10%	22.14%
Libya	66.5	12.21%	6.25%	Zimbabwe	59.3	18.46%	12.50%
Madagascar	64	14.99%	9.03%				

Bangladesh	10.96%	5.00%
Cambodia	13.60%	7.64%
China	6.94%	0.98%
Fiji	10.96%	5.00%
Hong Kong	6.65%	0.69%
India	8.60%	2.64%
Indonesia	8.60%	2.64%
Japan	6.94%	0.98%
Korea	6.65%	0.69%
Macao	6.80%	0.84%
Malaysia	7.63%	1.67%
Maldives	13.60%	7.64%
Mauritius	8.18%	2.22%
Mongolia	14.99%	9.03%
Pakistan	14.99%	9.03%
Papua New Guinea	13.60%	7.64%
Philippines	8.60%	2.64%
Singapore	5.96%	0.00%
Solomon Islands	14.99%	9.03%
Sri Lanka	12.21%	6.25%
Taiwan	8.18%	2.22%
Thailand	8.18%	2.22%
Vietnam	10.96%	5.00%
Asia	7.43%	1.47%

Abu Dhabi	6.65%	0.69%
Bahrain	13.60%	7.64%
Iraq	16.37%	10.41%
Israel	6.94%	0.98%
Jordan	12.21%	6.25%
Kuwait	6.65%	0.69%
Lebanon	14.99%	9.03%
Oman	9.02%	3.06%
Qatar	6.80%	0.84%
Ras Al Khaimah (Emirate of)	7.14%	1.18%
Saudi Arabia	6.94%	0.98%
Sharjah	7.63%	1.67%
United Arab Emirates	6.65%	0.69%
Middle East	7.96%	2.00%

Black #: Total ERP

Red #: Country risk premium

Regional #: GDP weighted average

Australia	5.96%	0.00%
Cook Islands	12.21%	6.25%
New Zealand	5.96%	0.00%
Australia & New Zealand	5.96%	0.00%

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?

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.

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.

$$\begin{aligned} R_j &= R_f + b (R_m - R_f) \\ &= R_f (1-b) + b R_m \end{aligned} \quad \dots \quad \text{Capital Asset Pricing Model}$$

$$R_j = a + b R_m \quad \dots \quad \text{Regression Equation}$$

- 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 $R_f (1-b)$ is Jensen's alpha. If it is positive, your stock did perform better than expected during the period of the regression.

Setting up for the Estimation

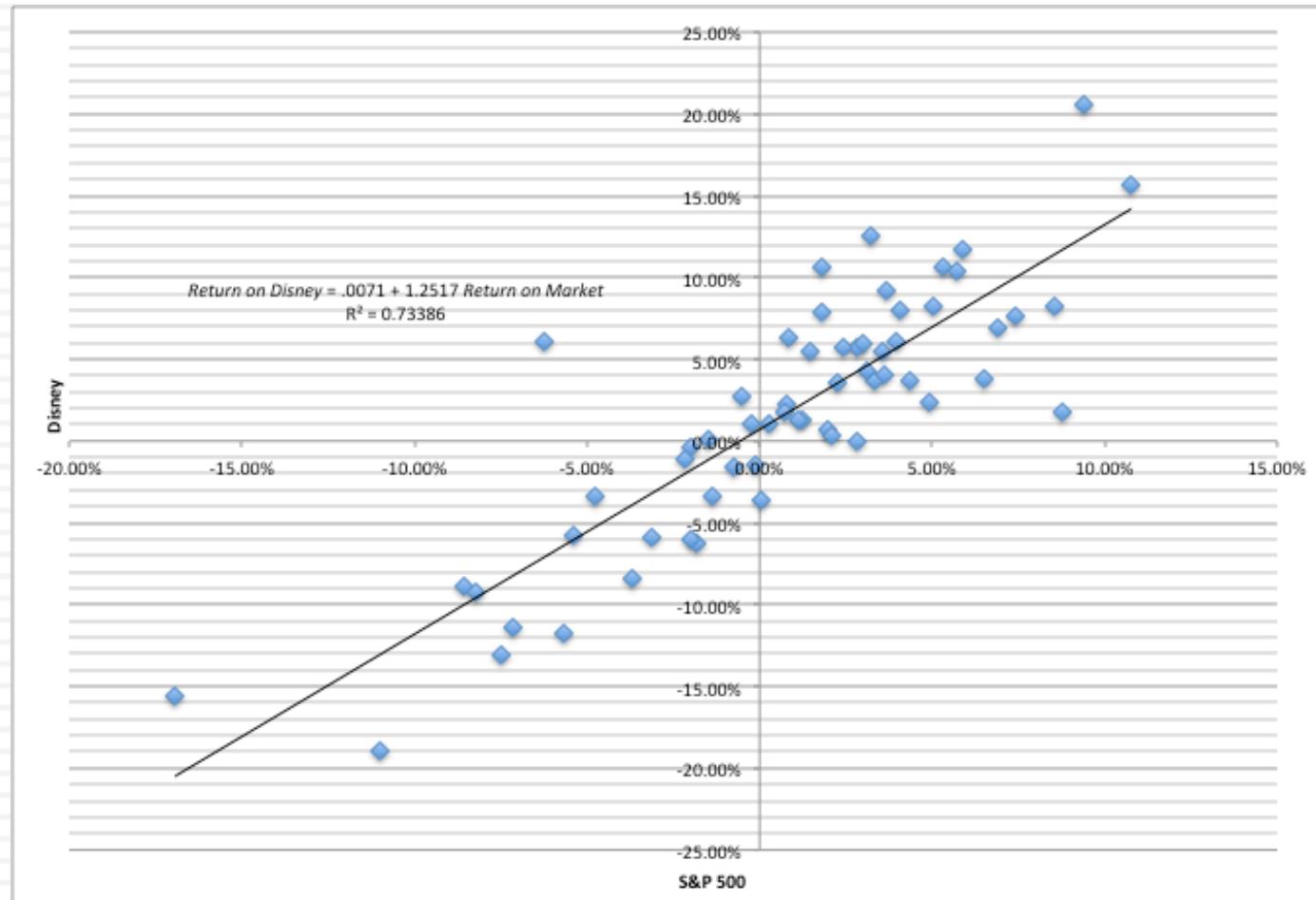
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- Decide on an estimation period
 - ▣ Services use periods ranging from 2 to 5 years for the regression
 - ▣ Longer estimation period provides more data, but firms change.
 - ▣ Shorter periods can be affected more easily by significant firm-specific 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
 - ▣ $\text{Return} = (\text{Price}_{\text{End}} - \text{Price}_{\text{Beginning}} + \text{Dividends}_{\text{Period}}) / \text{Price}_{\text{Beginning}}$
 - ▣ Included dividends only in ex-dividend month
- Choose a market index, and estimate returns (inclusive of dividends) on the index for each interval for the period.

Choosing the Parameters: Disney

- Period used: 5 years
- Return Interval = Monthly
- Market Index: S&P 500 Index.
- For instance, to calculate returns on Disney in December 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 $= (1115.1 - 1095.63 + 1.683) / 1095.63 = 1.78\%$

Disney's Historical Beta



$Return \text{ on Disney} = .0071 + 1.2517 \text{ Return on Market}$
(0.10)

$R^2 = 0.73386$

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) = $0.042\% (1 - 1.252) = -0.0105\%$
- 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 = $(1.00723)^{12} - 1 = 9.02\%$

More on Jensen's Alpha

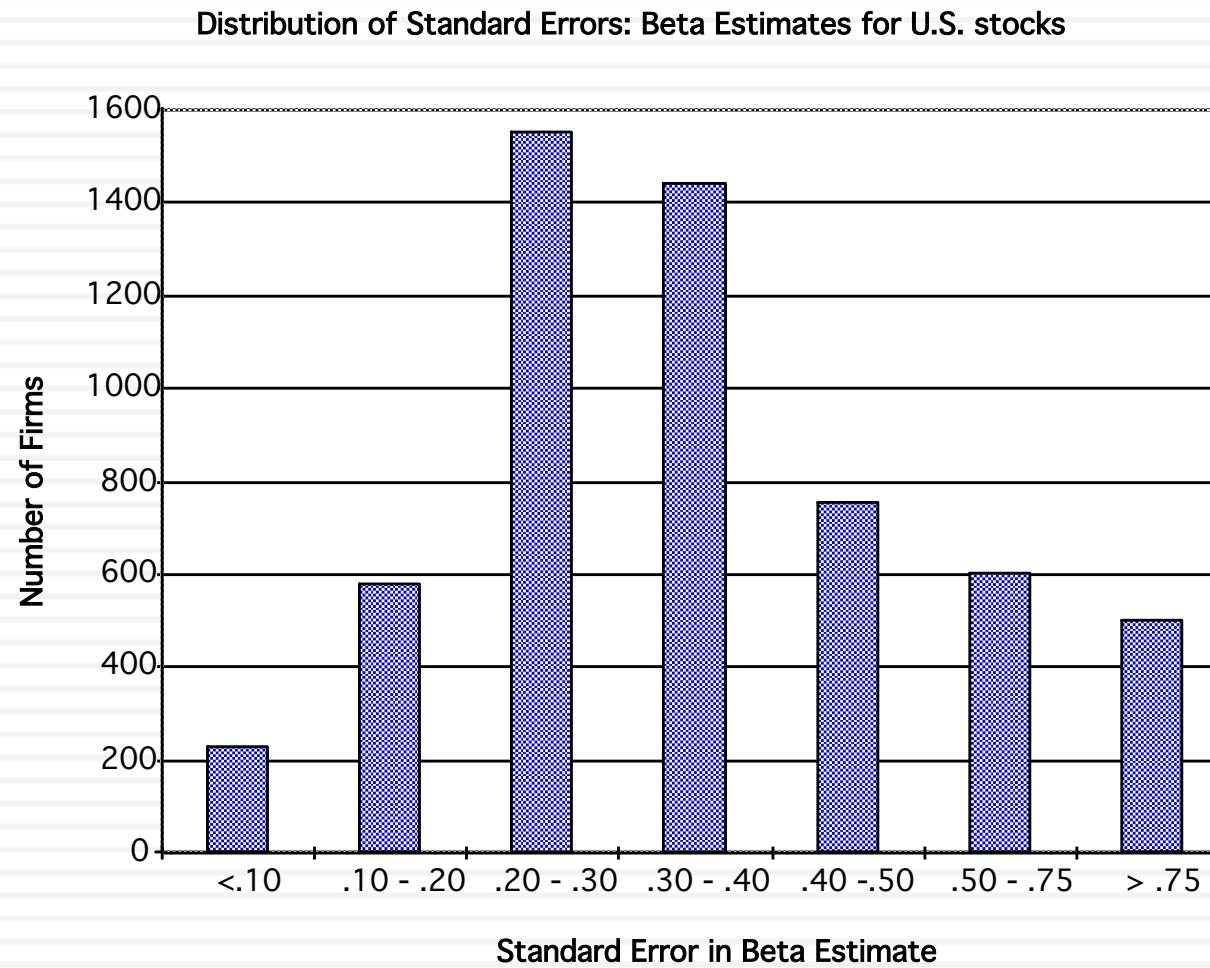
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- If you did this analysis on every stock listed on an exchange, what would the average Jensen's alpha be across all stocks?
 - a. Depend upon whether the market went up or down during the period
 - b. Should be zero
 - c. Should be greater than zero, 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

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?

The Dirty Secret of “Standard Error”



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?

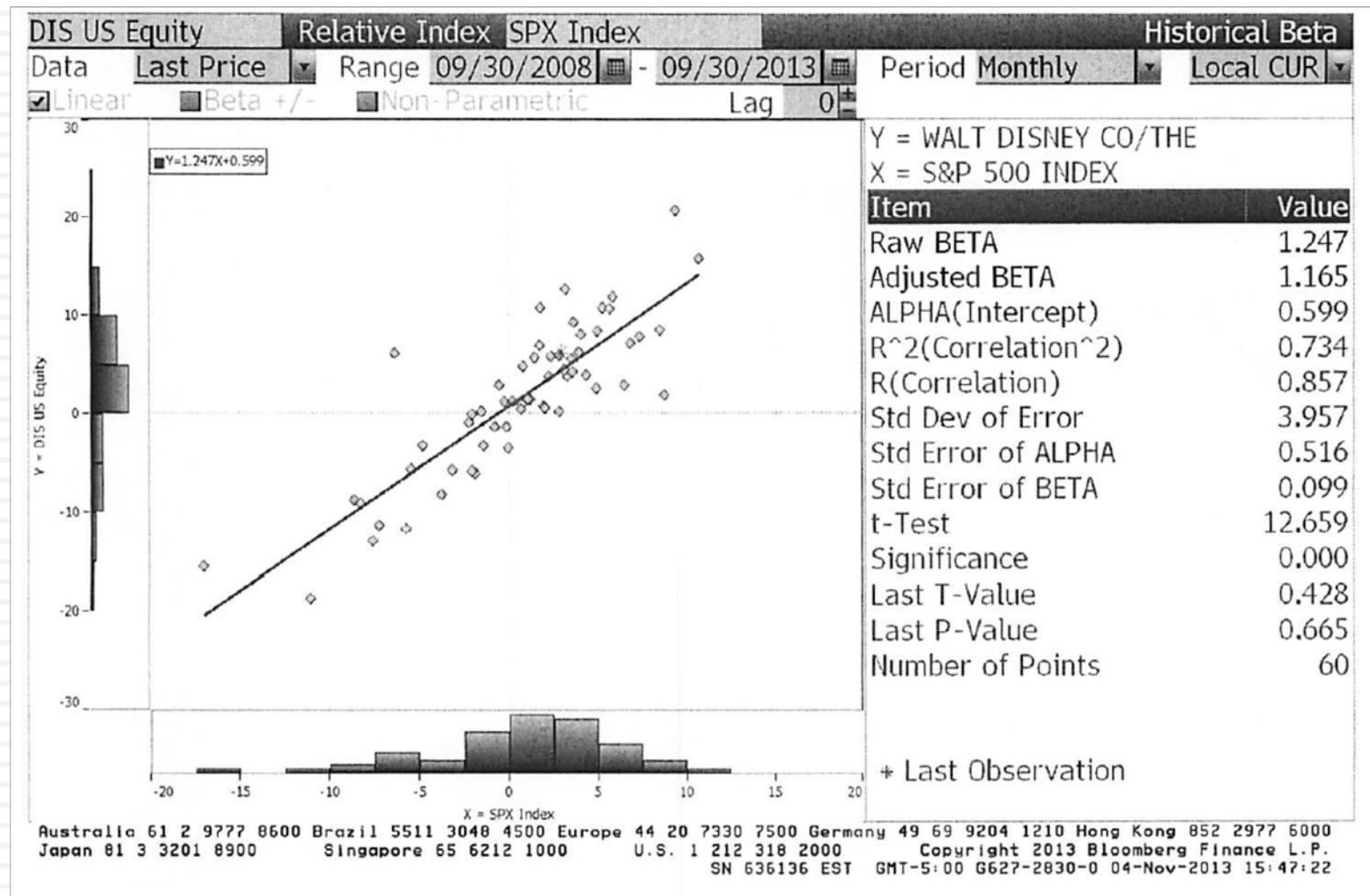
- What are the implications for investors?

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?

Beta Estimation: Using a Service (Bloomberg)



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)

$$\begin{aligned}\text{Expected Return} &= \text{Riskfree Rate} + \text{Beta} (\text{Risk Premium}) \\ &= 2.75\% + 1.25 (5.76\%) = 9.95\%\end{aligned}$$

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

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?

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

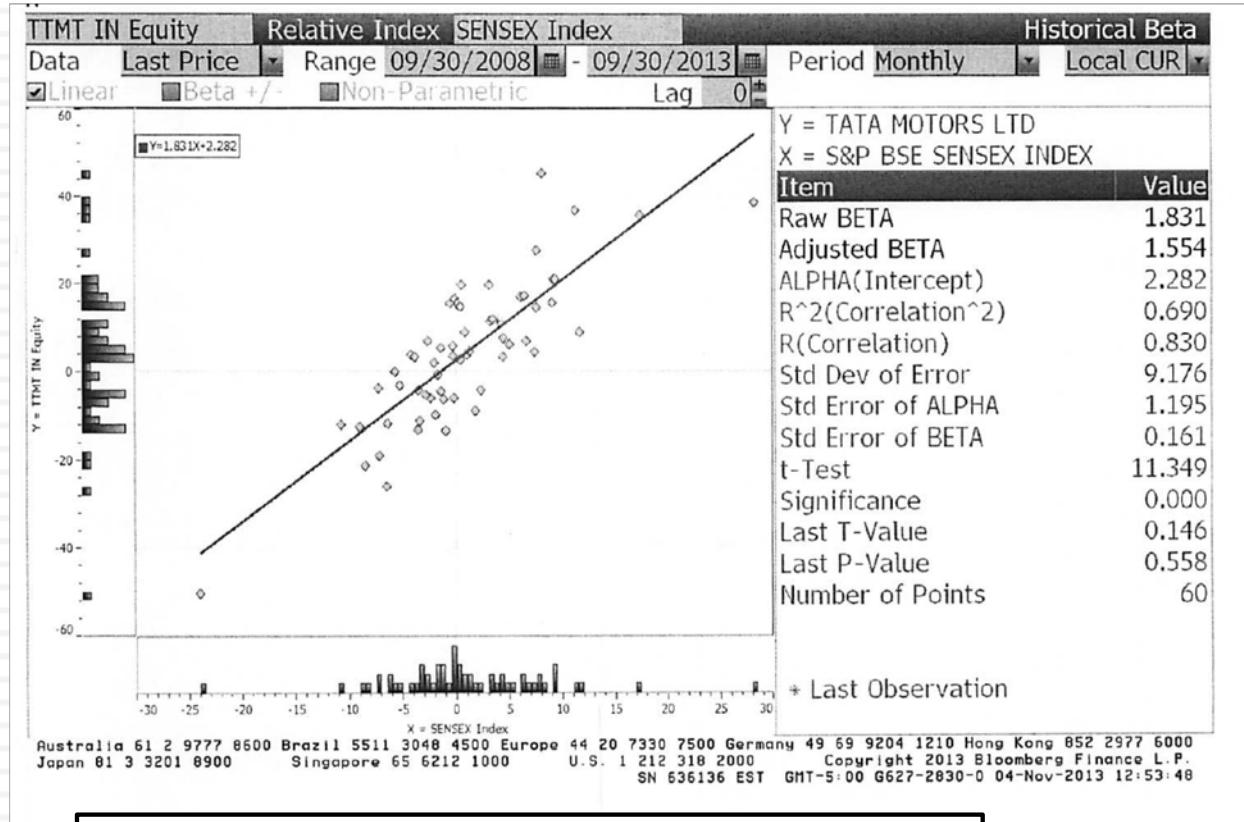
A Quick Test

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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

Regression Diagnostics for Tata Motors



Beta = 1.83
67% range
1.67-1.99

69% market risk
31% firm specific

Jensen's α

$$= 2.28\% - 4\%/12 (1-1.83) = 2.56\%$$

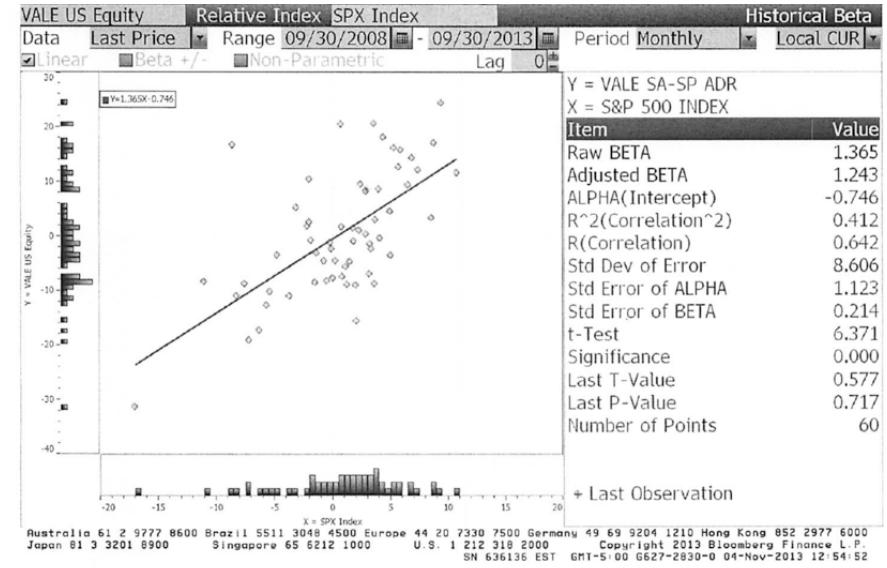
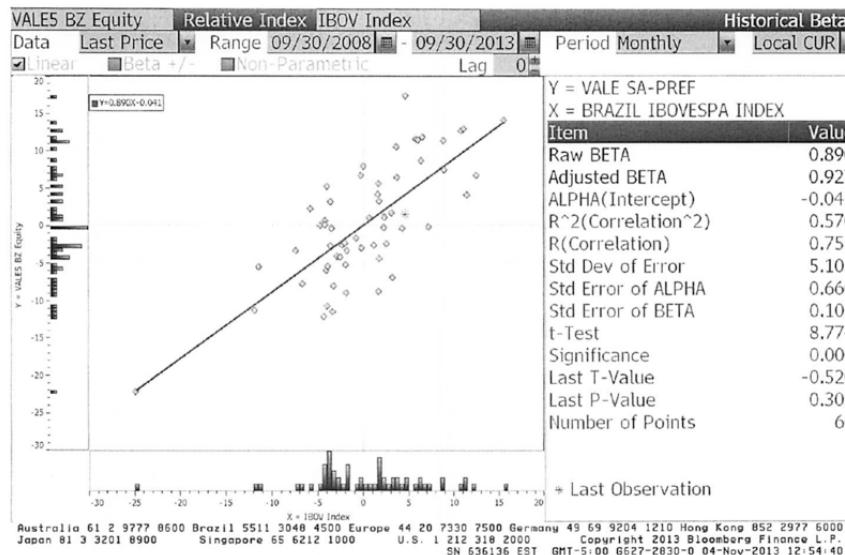
$$\text{Annualized} = (1+0.0256)^{12}-1 = 35.42\%$$

Average monthly riskfree rate (2008-13) = 4%

Expected Return (in Rupees)

$$\begin{aligned} &= \text{Riskfree Rate} + \text{Beta} * \text{Risk premium} \\ &= 6.57\% + 1.83 (7.19\%) = 19.73\% \end{aligned}$$

A better beta? Vale



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.

	<i>DAX</i>	<i>FTSE Euro 100</i>
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.

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

Beta: Exploring Fundamentals

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Beta > 2	Bulgari: 2.45
Beta between 1 and 2	Qwest Communications: 1.85 Microsoft: 1.25 GE: 1.15
Beta <1	Exxon Mobil: 0.70 Altria (Philip Morris): 0.60
Beta <0	Harmony Gold Mining: -0.15

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

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

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.

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.

Disney's Operating Leverage: 1987- 2013

Year	Net Sales	% Change in Sales	EBIT	% Change in EBIT	Operating Leverage
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%	11.91 / 11.79 = 1.01
Average: 96-13		8.16%		10.20%	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?

- Higher
- Lower
- No effect

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?
 - Levered
 - Unlevered

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

Disney : Beta and Financial Leverage

<i>Debt to Capital</i>	<i>Debt/Equity Ratio</i>	<i>Beta</i>	<i>Effect of Leverage</i>
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

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.

The Disney/Cap Cities Merger (1996): Pre-Merger

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Disney: The Acquirer

Equity Beta
1.15

Debt = \$3,186 million
Market value of equity = \$31,100 million
Debt + Equity = Firm value = \$31,100
+ \$3186 = \$34,286 million
D/E Ratio = 3186/31100 = 0.10

+

Capital Cities: The Target

Equity Beta
0.95

Debt = \$ 615 million
Market value of equity = \$18, 500 million
Debt + Equity = Firm value = \$18,500 +
\$615 = \$19,115 million
D/E Ratio = 615/18500 = 0.03

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]

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

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.

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

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

<i>Business</i>	<i>Revenues</i>	<i>Operating Income</i>	<i>D&A</i>	<i>EBITDA</i>	<i>S, G & A Costs</i>	<i>Cap Ex</i>	<i>Identifiable Assets</i>
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

Unlevered Betas for businesses

Unlevered Beta

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

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

A closer look at the process...

Studio Entertainment Betas

Company Name	Levered Beta	Market Capitalization	+ Total Debt including Leases	=Firm Value	-Cash	= Enterprise Value	Cash/Firm Value	Pre-tax cost of debt	Marginal tax rate	Gross D/E ratio	Revenue (Sales)	EV/Sales
SFX Entertainment Inc. (NasdaqGS:SFXE)	1.12	\$738.8	\$98.9	\$837.7	\$143.6	\$694.1	17.14%	8.46%	40.00%	13.39%	62.0	11.20
Mass Hysteria Entertainment Company, Inc. (OTCPK:MHYS)	1.19	\$0.2	\$1.1	\$1.4	\$-	\$1.4	0.00%	10.00%	40.00%	477.94%	0	12.45
Medient Studios, Inc. (OTCPK:MDNT)	0.93	\$3.2	\$3.2	\$6.4	\$0.1	\$6.3	0.81%	4.84%	40.00%	99.07%	5.22	1.21
POW! Entertainment, Inc. (OTCPK:POWN)	0.94	\$4.0	\$0.3	\$4.3	\$0.4	\$3.9	9.85%	4.00%	40.00%	8.65%	2.03	1.92
MGM Holdings Inc. (OTCPK:MGMB)	1.29	\$3,631.7	\$142.2	\$3,773.9	\$140.7	\$3,633.2	3.73%	10.00%	40.00%	3.91%	1,892.6	1.92
Lions Gate Entertainment Corp. (NYSE:LGF)	1.20	\$4,719.6	\$1,283.2	\$6,002.8	\$67.2	\$5,935.6	1.12%	6.34%	40.00%	27.19%	2,597.8	2.28
DreamWorks Animation SKG Inc. (NasdaqGS:DWA)	1.32	\$2,730.0	\$348.3	\$3,078.3	\$156.4	\$2,921.9	5.08%	3.00%	40.00%	12.76%	767.3	3.81
Twenty-First Century Fox, Inc. (NasdaqGS:FOXA)	1.28	\$77,743.5	\$20,943.0	\$98,686.5	\$6,681.0	\$92,005.5	6.77%	6.15%	40.00%	26.94%	28,733.0	3.20
Independent Film Development Corporation (OTCPK:IFLM)	1.61	\$1.3	\$1.0	\$2.3	\$-	\$2.2	2.20%	10.00%	40.00%	72.35%	1	3.37
Odyssey Pictures Corp. (OTCPK:OPIX)	2.60	\$0.3	\$1.6	\$1.9	\$0.0	\$1.9	0.10%	3.00%	40.00%	551.12%	0.669	2.90
Average	1.35						4.68%	6.58%	40.00%	129.33%		4.43
Aggregate	1.35		\$22,822.82	\$112,395.45	\$7,189.43	\$105,206.02	6.40%	6.58%	40.00%	25.48%	34,061.4	3.09
Median	1.24						2.96%	6.24%	40.00%	27.06%		3.05

Backing into a pure play beta: Studio Entertainment

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	<i>Value</i>	<i>Beta</i>		<i>Value</i>	<i>Beta</i>
Movie Business	97.04	1.0993	Debt	21.3	0
Cash Business	2.96	0	Equity	78.7	1.24
Movie Company	100	1.0668			

1. Start with the median regression beta (equity beta) of 1.24
2. Unlever the beta, using the median gross D/E ratio of 27.06%

$$\text{Gross D/E ratio} = 21.30/78.70 = 27.06\%$$

$$\text{Unlevered beta} = 1.24 / (1 + (1 - .4) (.2706)) = 1.0668$$
3. Take out the cash effect, using the median cash/value of 2.96%

$$(.0296) (0) + (1 - .0296) (\text{Beta of movie business}) = 1.0668$$

$$\text{Beta of movie business} = 1.0668 / (1 - .0296) = 1.0993$$

Alternatively, you could have used the net debt to equity ratio

$$\text{Net D/E ratio} = (21.30 - 2.96) / 78.70 = 23.30\%$$

$$\text{Unlevered beta for movies} = 1.24 / (1 + (1 - .4) (.233)) = 1.0879$$

Disney's unlevered beta: Operations & Entire Company

<i>Business</i>	<i>Revenues</i>	<i>EV/Sales</i>	<i>Value of Business</i>	<i>Proportion of Disney</i>	<i>Unlevered beta</i>	<i>Value</i>	<i>Proportion</i>
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):

$$\begin{aligned}\beta_{Disney} &= \beta_{Operating\ Assets} \frac{Value_{Operating\ Assets}}{(Value_{Operating\ Assets} + Value_{Cash})} + \beta_{Cash} \frac{Value_{Cash}}{(Value_{Operating\ Assets} + Value_{Cash})} \\ &= 0.9239 \left(\frac{135,132}{(135,132 + 3,931)} \right) + 0.00 \left(\frac{3,931}{(135,132 + 3,931)} \right) = 0.8978\end{aligned}$$

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.

<i>Business</i>	<i>Identifiable assets (2013)</i>	<i>Proportion of debt</i>	<i>Value of business</i>	<i>Allocated debt</i>	<i>Estimated equity</i>	<i>D/E ratio</i>
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.

<i>Business</i>	<i>Unlevered beta</i>	<i>Value of business</i>	<i>D/E ratio</i>	<i>Levered beta</i>	<i>Cost of Equity</i>
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%

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?

Estimating Bottom Up Betas & Costs of Equity: Vale

<i>Business</i>	<i>Sample</i>	<i>Sample size</i>	<i>Unlevered beta of business</i>	<i>Revenues</i>	<i>Peer Group EV/Sales</i>	<i>Value of Business</i>	<i>Proportion of Vale</i>
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%
<i>Vale Operations</i>			<i>0.8440</i>	<i>\$47,151</i>		<i>\$106,543</i>	<i>100.00%</i>

<i>Business</i>	<i>Unlevered beta</i>	<i>D/E ratio</i>	<i>Levered beta</i>	<i>Risk free rate</i>	<i>ERP</i>	<i>Cost of Equity</i>
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%

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 rate in Brazil, we can convert Vale's US dollar cost of equity of 11.23% to a \$R cost of equity:

$$\begin{aligned} \text{Cost of Equity}_{\text{Nominal R\$}} &= (1 + \text{Cost of Equity}_{\text{US\$}}) \frac{(1 + \text{Expected Inflation}_{\text{R\$}})}{(1 + \text{Expected Inflation}_{\text{US\$}})} - 1 \\ &= (1.1123) \frac{(1.09)}{(1.02)} - 1 = 18.87\% \end{aligned}$$

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

$$\text{Cost of Equity in \$R} = 10.18\% + 1.15 (7.38\%) = 18.67\%$$

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 = $0.8601 (1 + (1 - 0.3245) (0.4141)) = 1.1007$

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 = $1.30 (1 + (1 - 0.25) (0.0523)) = 1.356$

Cost of Equity for Baidu (Renmimbi) = $3.50\% + 1.356 (6.94\%) = 12.91\%$

Bottom up Betas and Costs of Equity: Deutsche Bank

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

<i>Business</i>	<i>Sample used</i>	<i>Sample size</i>	<i>Median Levered Beta</i>	<i>Deutsche Net Revenues in 2012</i>	<i>Proportion</i>
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%:

<i>Business</i>	<i>Beta</i>	<i>Cost of Equity</i>
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%

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

Using comparable firms to estimate beta for Bookscape

<i>Company Name</i>	<i>Industry</i>	<i>Market Capitalization</i>	<i>Levered Beta</i>	<i>Marginal tax rate</i>	<i>Gross D/E ratio</i>	<i>Cash/Firm Value</i>	<i>R²</i>
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 = $0.7205 / (1 - .05) = 0.7584$

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.
$$\text{Levered beta for Bookscape} = 0.7584[1 + (1 - 0.40)(0.2141)] = 0.8558$$
- ❑ Using a riskfree rate of 2.75% (US treasury bond rate) and an equity risk premium of 5.5%:
$$\text{Cost of Equity} = 2.75\% + 0.8558(5.5\%) = 7.46\%$$

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

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%.

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

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

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](#).

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

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.

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.

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:

$$\begin{aligned}\text{Cost of debt}_{\text{R\$}} &= (1 + \text{Cost of debt}_{\text{US\$}}) \frac{(1 + \text{Expected Inflation}_{\text{R\$}})}{(1 + \text{Expected Inflation}_{\text{US\$}})} - 1 \\ &= (1.0405) \frac{(1.09)}{(1.02)} - 1 = 11.19\%\end{aligned}$$

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

Interest Coverage Ratios, Ratings and Default Spreads- November 2013

<i>Large cap (>\$5 billion)</i>	<i>Small cap or risky (<\$5 billion)</i>	<i>Rating is (S&P/Moody's)</i>	<i>Spread (11/13)</i>
>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-

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...

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.

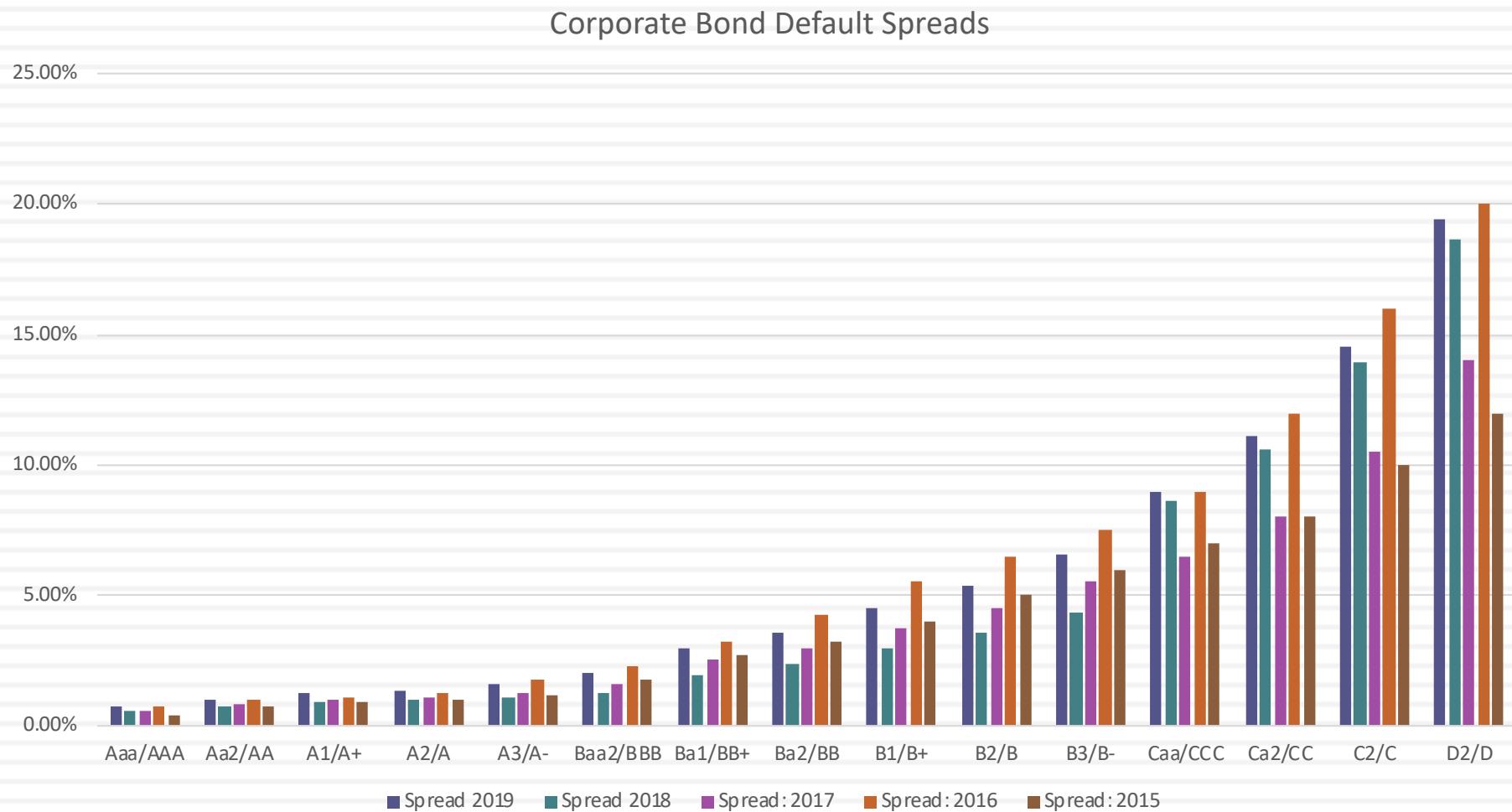
Company	S&P Rating	Risk-Free Rate	Default Spread	Cost of Debt	Tax Rate	After-Tax Cost of Debt
Disney	A	2.75% (US \$)	1.00%	3.75%	36.1%	2.40%
Deutsche Bank	A	1.75% (Euros)	1.00%	2.75%	29.48%	1.94%
Vale	A-	2.75% (US \$)	1.30%	4.05%	34%	2.67%

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

$$\begin{aligned}\text{Cost of debt}_{\text{TMT}} &= \text{Risk free rate}_{\text{Rupees}} + \text{Default spread}_{\text{India}} + \text{Default spread}_{\text{TMT}} \\ &= 6.57\% + 2.25\% + 0.70\% = 9.62\%\end{aligned}$$

$$\text{After-tax cost of debt} = 9.62\% (1-0.3245) = 6.50\%$$

Default Spreads – January 2019



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

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:
 - ▣ $k_{ps} = \text{Preferred Dividend per share} / \text{Market Price per preferred share}$
- 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.

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.

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 =

$$349 \left[\frac{\left(1 - \frac{1}{(1.0375)^{7.92}}\right)}{.0375} \right] + \frac{14,288}{(1.0375)^{7.92}} = \$13,028 \text{ million}$$

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

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

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 = $8.52\%(.8842) + 2.40\%(.1158) = 7.81\%$

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

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%

Costs of Capital: Tata Motors, Baidu and Bookscape

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

$$\text{Cost of capital} = 14.49\% (1 - .2928) + 6.50\% (.2928) = 12.15\%$$

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

$$\text{Cost of capital} = 12.91\% (1 - .0523) + 3.45\% (.0523) = 12.42\%$$

- 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%

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?

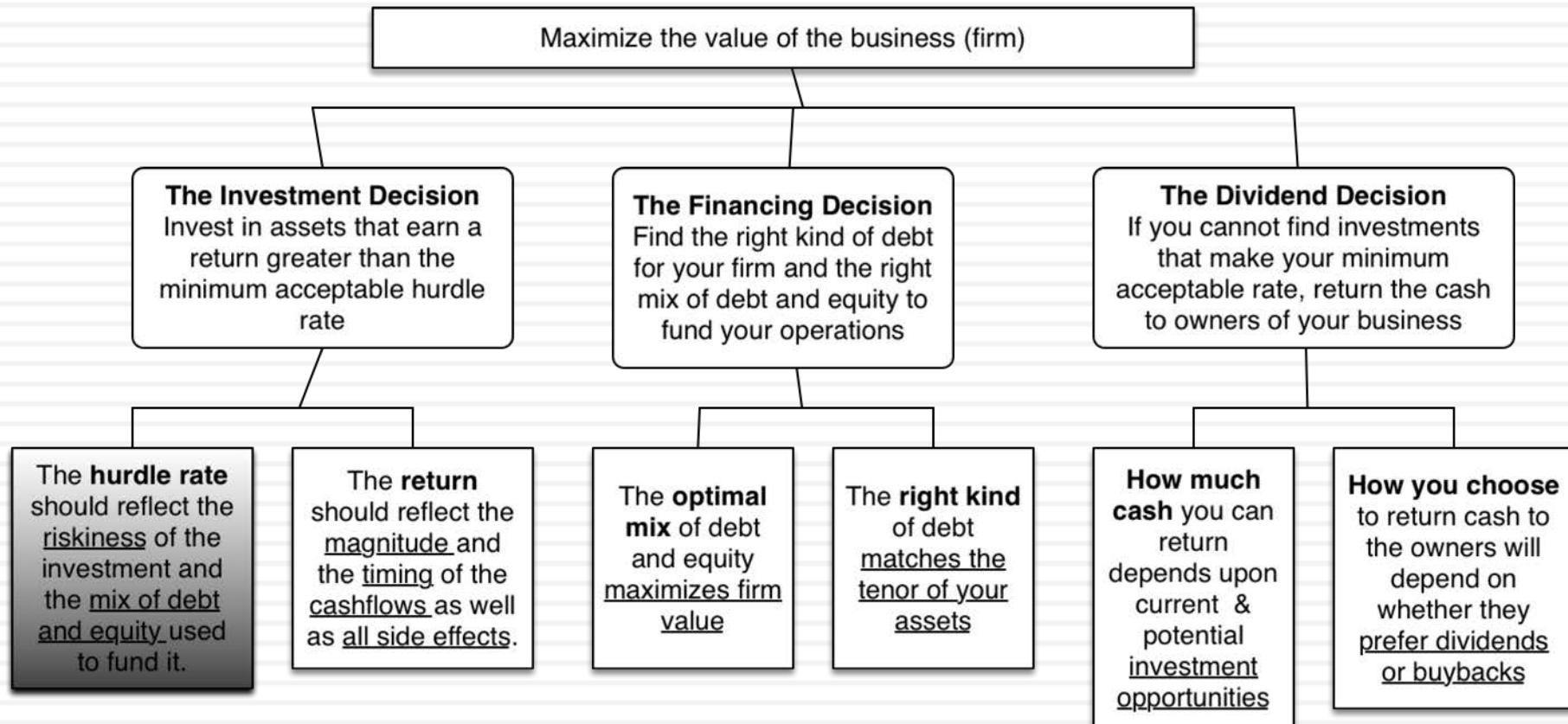
Choosing a Hurdle Rate

195

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

Back to First Principles

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MEASURING INVESTMENT RETURNS

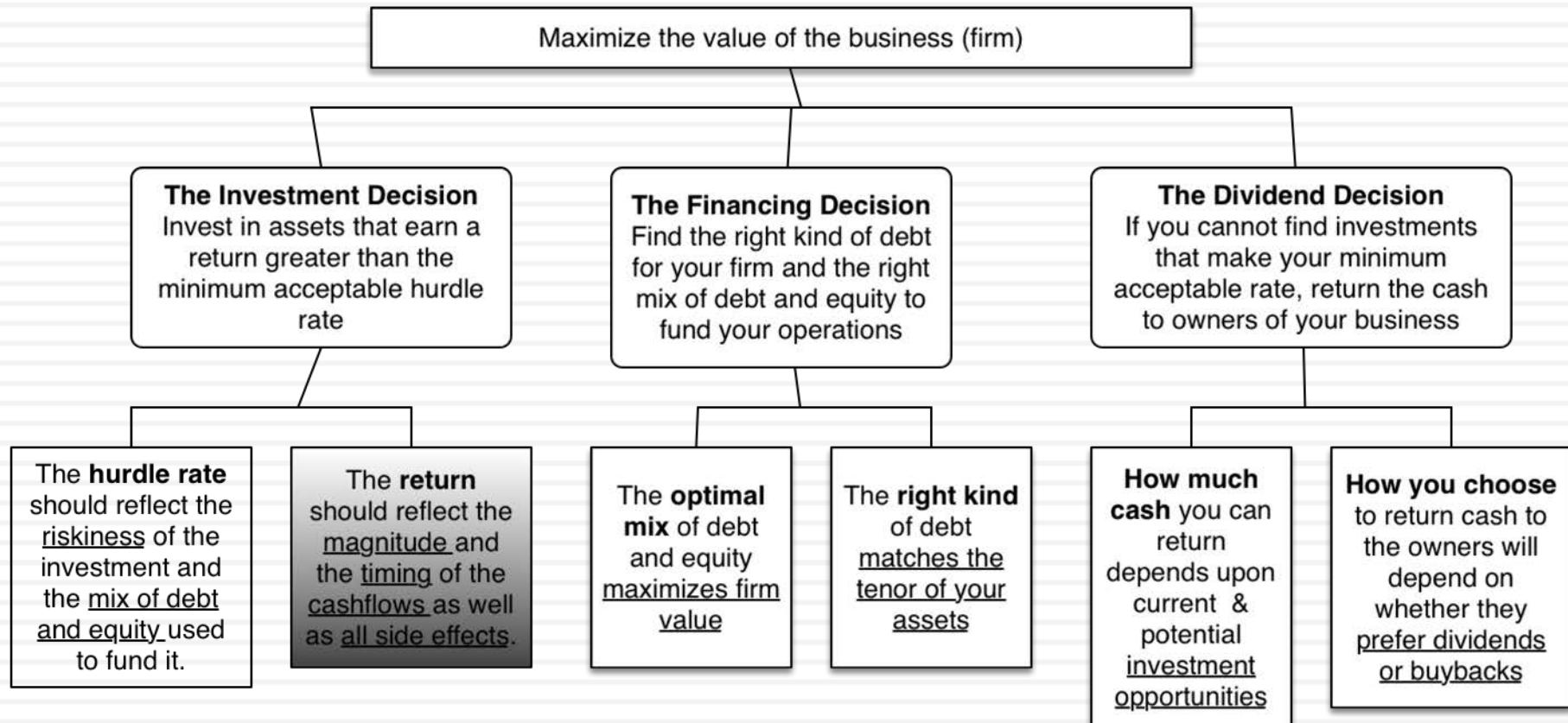
I: THE MECHANICS OF INVESTMENT ANALYSIS

“Show me the money”

from Jerry Maguire

First Principles

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Measures of return: earnings versus cash flows

199

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

Measuring Returns Right: The Basic Principles

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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”

Setting the table: What is an investment/project?

201

- An investment/project can range the spectrum from big to small, money making to cost saving:
 - ▣ Major strategic decisions to enter new areas of business or new markets.
 - ▣ Acquisitions of other firms are projects as well, notwithstanding attempts to create separate sets of rules for them.
 - ▣ Decisions on new ventures within existing businesses or markets.
 - ▣ Decisions that may change the way existing ventures and projects are run.
 - ▣ Decisions on how best to deliver a service that is necessary for the business to run smoothly.
- Put in broader terms, every choice made by a firm can be framed as an investment.

Here are four examples...

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- Rio Disney: We will consider whether Disney should invest in its first theme parks in South America. These parks, while similar to those that Disney has in other parts of the world, will require us to consider the effects of country risk and currency issues in project analysis.
- New iron ore mine for Vale: This is an iron ore mine that Vale is considering in Western Labrador, Canada.
- An Online Store for Bookscape: Bookscape is evaluating whether it should create an online store to sell books. While it is an extension of their basic business, it will require different investments (and potentially expose them to different types of risk).
- Acquisition of Harman by Tata Motors: A cross-border bid by Tata for Harman International, a publicly traded US firm that manufactures high-end audio equipment, with the intent of upgrading the audio upgrades on Tata Motors' automobiles. This investment will allow us to examine currency and risk issues in such a transaction.

Earnings versus Cash Flows: A Disney Theme Park

203

- 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.

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.

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

-

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.

Depreciation and Capital Maintenance

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Year	<i>Depreciation as % of Book Value</i>	<i>Capital Maintenance as % of Depreciation</i>
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.

Other Assumptions

208

- 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 36.1%.

Laying the groundwork: Book Capital, Working Capital and Depreciation

209

	0	1	2	3	4	5	6	7	8	9	10
<i>Book Value of Pre-project inv</i>	\$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
<i>Book Value of new Fixed Assets</i>	\$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)

Step 1: Estimate Accounting Earnings on Project

210

	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

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

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

Should there be a risk premium for foreign projects?

213

- The exchange rate risk should be diversifiable risk (and hence should not command a premium) if
 - the company has projects in a large number of countries (or)
 - the investors in the company are globally diversified.
 - For Disney, this risk should not affect the cost of capital used. Consequently, we would not adjust the cost of capital for Disney's investments in other mature markets (Germany, UK, France)
- The same diversification argument can also be applied against 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)

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Estimating a hurdle rate for Rio Disney

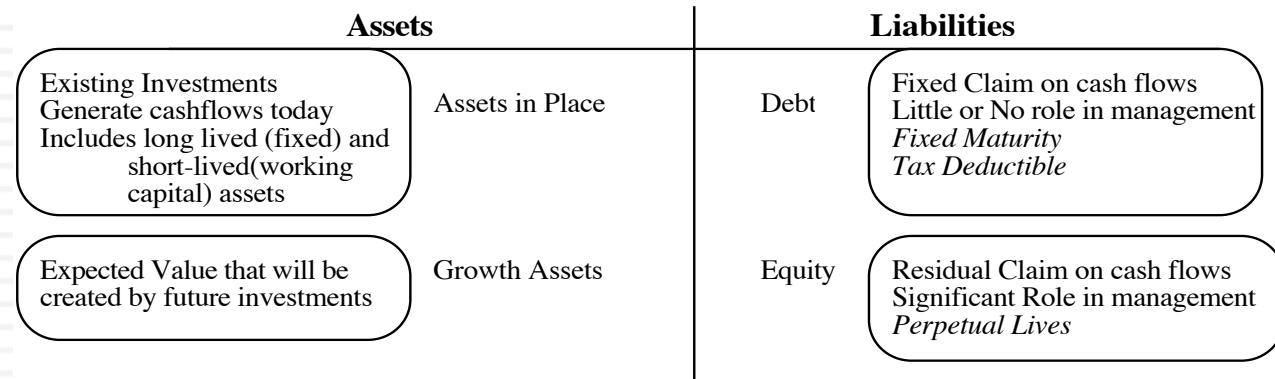
- We did estimate a cost of capital of 6.61% for the Disney theme park business, using a bottom-up levered beta of 0.7537 for the business.
- This cost of equity may not adequately reflect the additional risk associated with the theme park being in an emerging market.
- The only concern we would have 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%

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

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

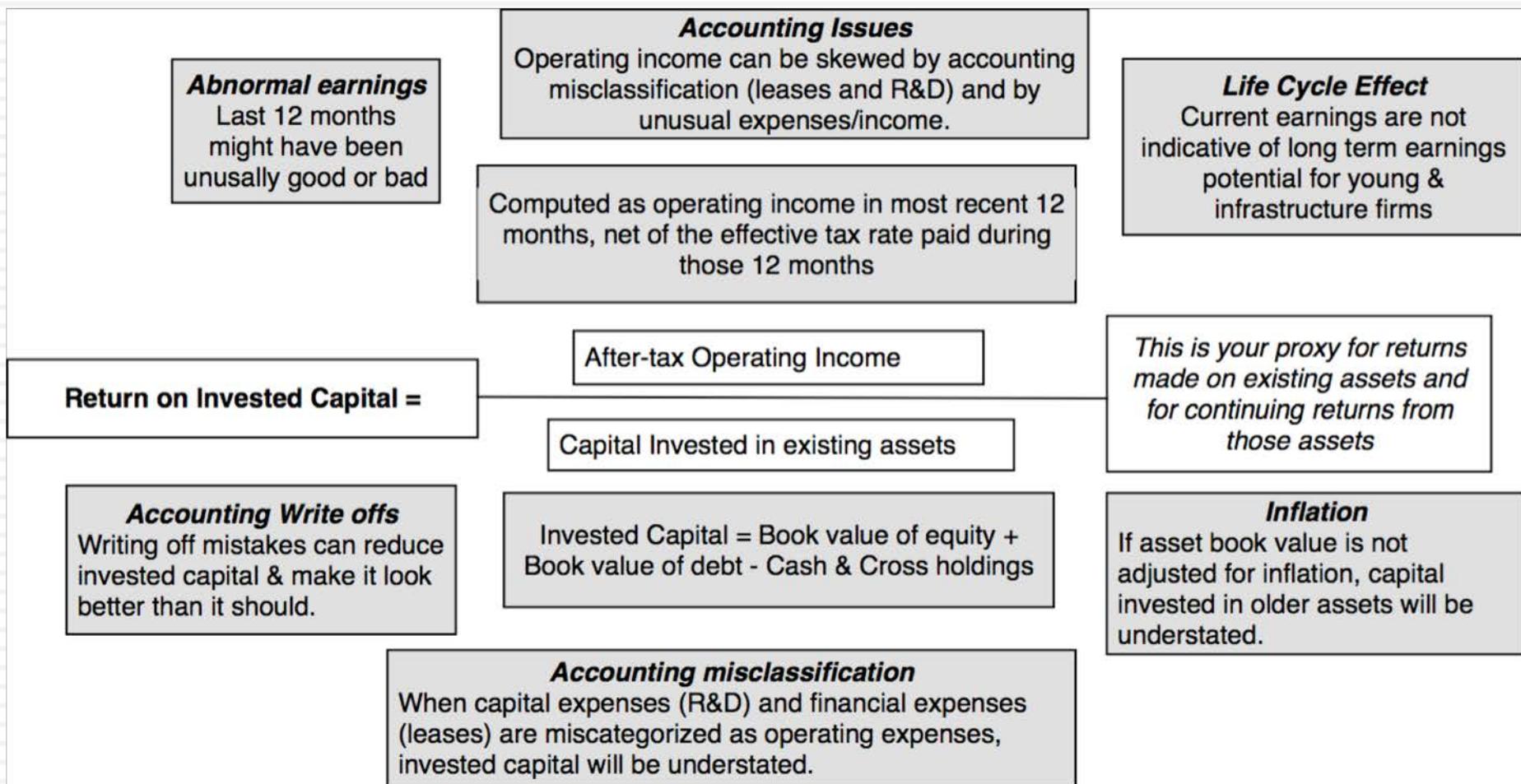
How “good” are the existing investments of the firm?



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%

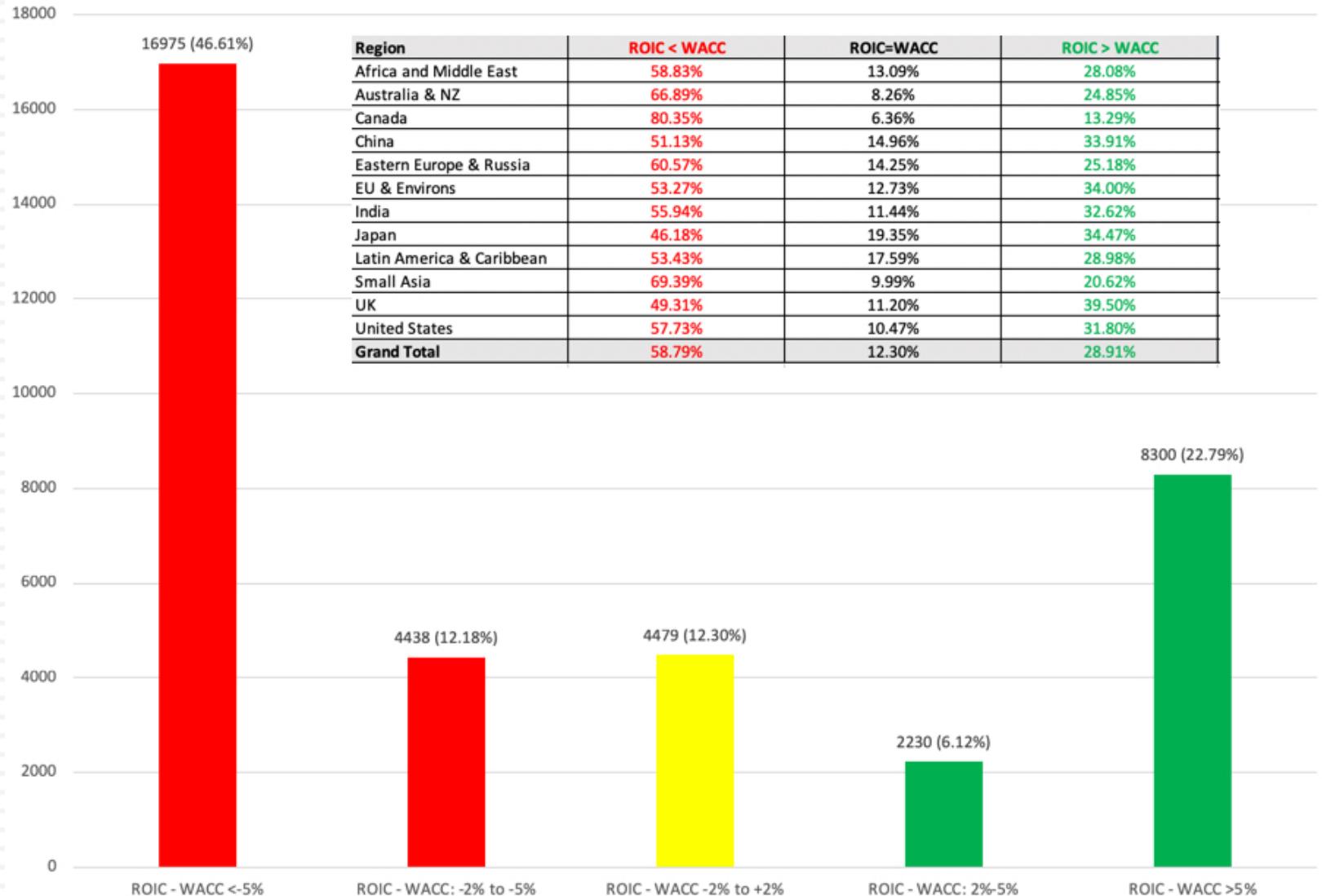
The return on capital is an accounting number, though, and that should scare you.



Return Spreads Globally....

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Excess Returns (ROIC - Cost of Capital) Globally - January 2019 update



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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 = $EBIT (1 - \text{tax rate}) / (\text{BV of debt} + \text{BV of Equity-Cash})$ 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

$$EVA = \text{Return Spread} * ((\text{BV of debt} + \text{BV of Equity-Cash}) \text{ previous year})$$

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

The Depreciation Tax Benefit

222

- 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:
- $\text{Tax Benefit} = \text{Depreciation} * \text{Tax Rate}$
- 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 Benefits 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.

Depreciation Methods

223

- 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

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.

To cap ex or not to cap ex?

225

- 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

The Working Capital Effect

226

- 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.

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 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

Sunk Costs

229

- 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.*

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

230

- 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?

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.

Breaking out G&A Costs into fixed and variable components: A simple example

232

- 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?

To Time-Weighted Cash Flows

233

- 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

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)	

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).
 - ▣ $NPV = \text{Sum of the present values of all cash flows on the project, including the initial investment, with the cash flows being discounted at the appropriate hurdle rate (cost of capital, if cash flow is cash flow to the firm, and cost of equity, if cash flow is to equity investors)}$
 - ▣ Decision Rule: Accept if $NPV > 0$
- Internal Rate of Return (IRR): The internal rate of return is the discount rate that sets the net present value equal to zero. It is the percentage rate of return, based upon incremental time-weighted cash flows.
 - ▣ Decision Rule: Accept if $IRR > \text{hurdle rate}$

Closure on Cash Flows

- In a project with a finite and short life, you would need to compute a salvage value, which is the expected proceeds from selling all of the investment in the project at the end of the project life. It is usually set equal to book value of fixed assets and working capital
- In a project with an infinite or very long life, we compute cash flows for a reasonable period, and then compute a terminal value for this project, which is the present value of all cash flows that occur after the estimation period ends..
- Assuming the project lasts forever, and that cash flows after year 10 grow 2% (the inflation rate) forever, the present value at the end of year 10 of cash flows after that can be written as:
 - Terminal Value in year 10= $CF_{in\ year\ 11} / (Cost\ of\ Capital - Growth\ Rate)$
 $=715\ (1.02) / (.0846-.02) = \$\ 11,275\ million$

Which yields a NPV of..

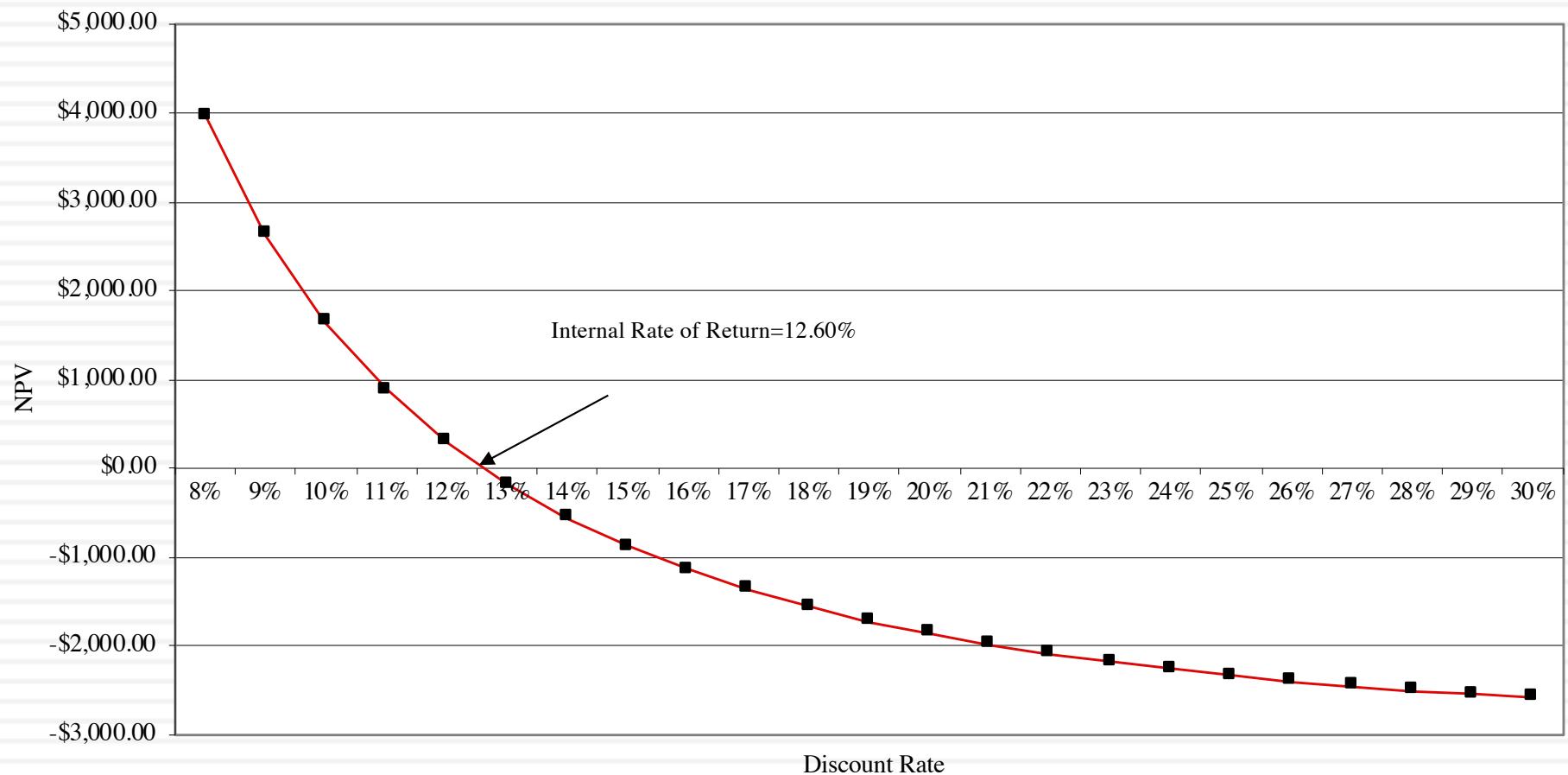
Year	Annual Cashflo	Terminal Value	Present Value
0	-\$2,000		-\$2,000
1	-\$1,000		-\$922
2	-\$859		-\$730
3	-\$267		-\$210
4	\$340		\$246
5	\$466		\$311
6	\$516		\$317
7	\$555		\$314
8	\$615		\$321
9	\$681		\$328
10	\$715	\$11,275	\$5,321
			\$3,296

Discounted at Rio Disney cost
of capital of 8.46%

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 IRR of this project



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 when 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”.

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

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.

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.
 - $\text{Expected Exchange Rate}_t = \text{Exchange Rate today} * (1.09/1.02)^t$
- 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:

$$\begin{aligned}\text{$R Cost of Capital} &= (1 + \text{US \$ Cost of Capital}) \frac{(1 + \text{Exp Inflation}_{\text{Brazil}})}{(1 + \text{Exp Inflation}_{\text{US}})} - 1 \\ &= (1.0846) (1.09/1.02) - 1 = 15.91\%\end{aligned}$$

Disney Theme Park: \$R NPV

Expected Exchange Rate_t
 $= \text{Exchange Rate today} * (1.09/1.02)^t$

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

Uncertainty in Project Analysis: What can we do?

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- Based on our expected cash flows and the estimated cost of capital, the proposed theme park looks like a very good investment for Disney. Which of the following may affect your assessment of value?
 - Revenues may be over estimated (crowds may be smaller and spend less)
 - Actual costs may be higher than estimated costs
 - Tax rates may go up
 - Interest rates may rise
 - Risk premiums and default spreads may increase
 - All of the above
- How would you respond to this uncertainty?
 - Will wait for the uncertainty to be resolved
 - Will not take the investment
 - Ask someone else (consultant, boss, colleague) to make the decision
 - Ignore it.
 - Other

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

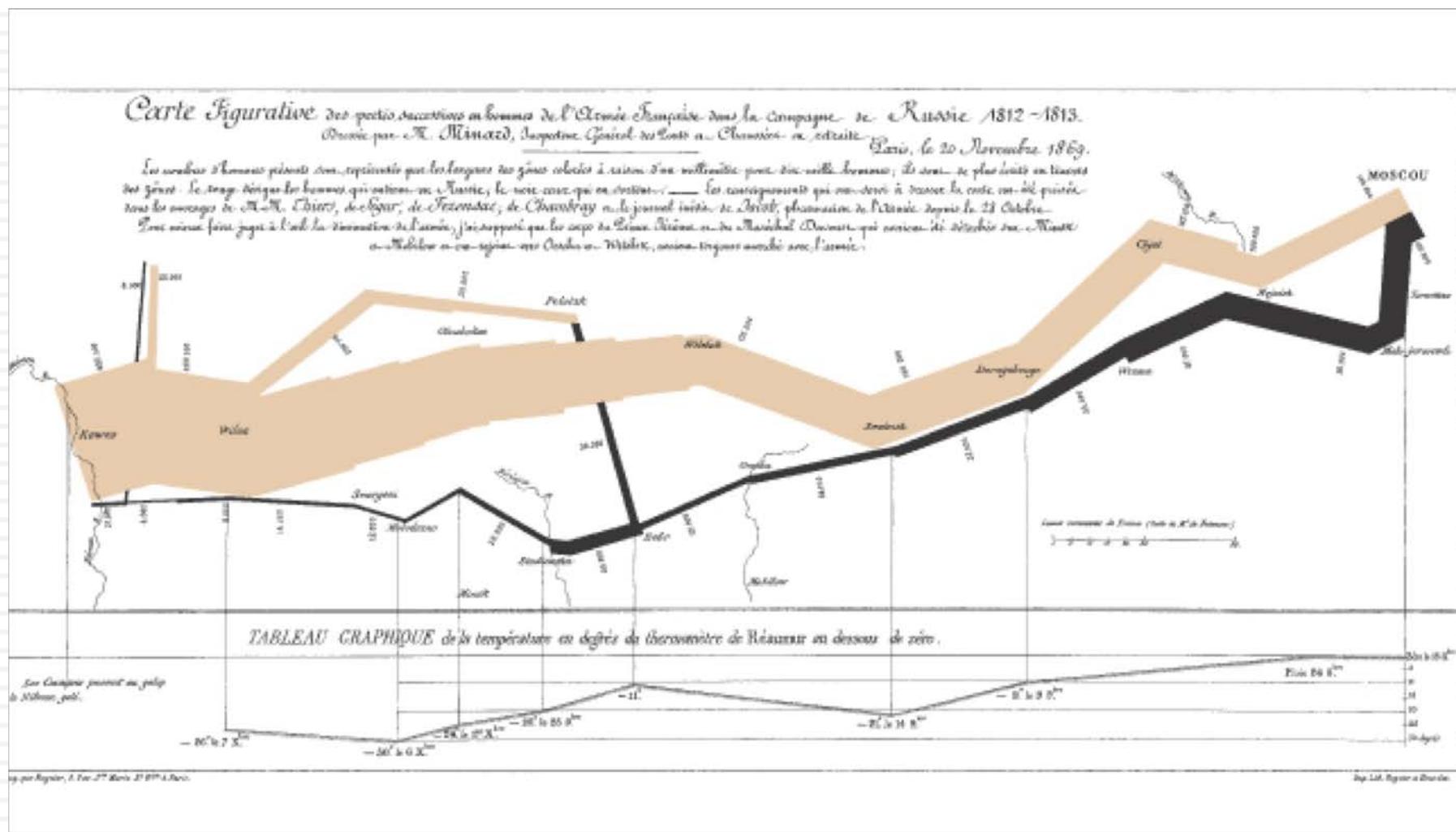
Payback = 10.3 years →

Discounted Payback
= 16.8 years

A slightly more sophisticated approach: Sensitivity Analysis & What-if Questions...

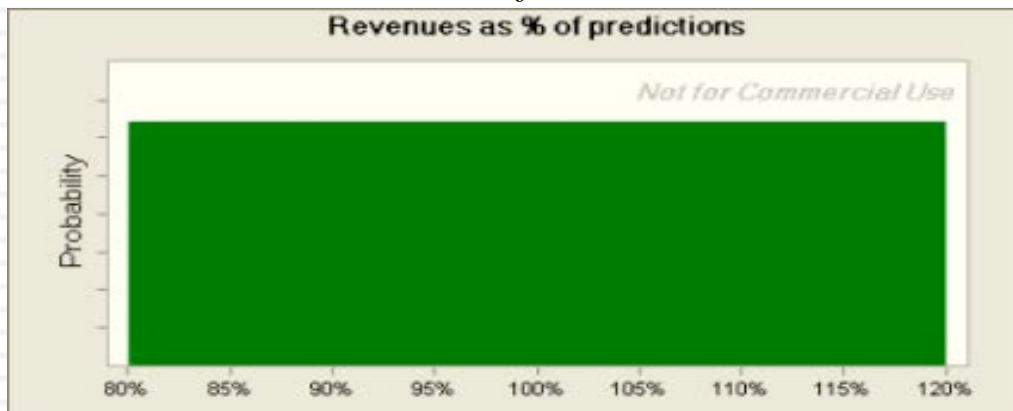
- The NPV, IRR and accounting returns for an investment will change as we change the values that we use for different variables.
- One way of analyzing uncertainty is to check to see how sensitive the decision measure (NPV, IRR..) is to changes in key assumptions. While this has become easier and easier 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).

And here is a really good picture...

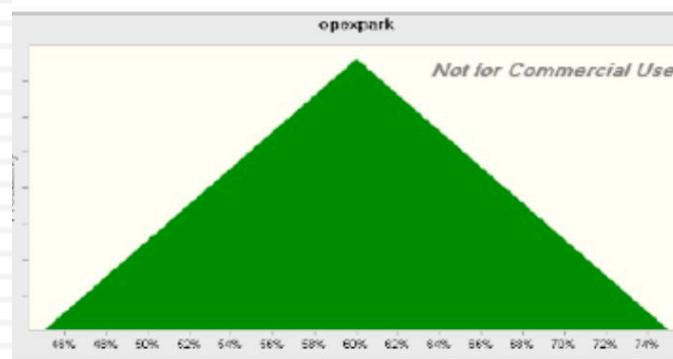


The final step up: Incorporate probabilistic estimates.. Rather than expected values..

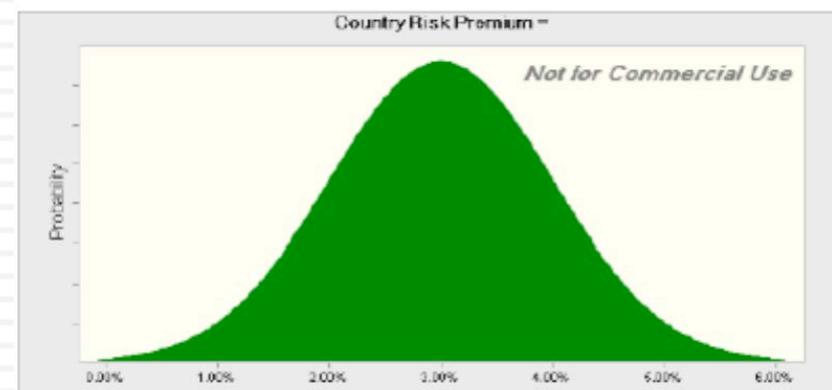
Actual Revenues as % of Forecasted Revenues (Base case = 100%)



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

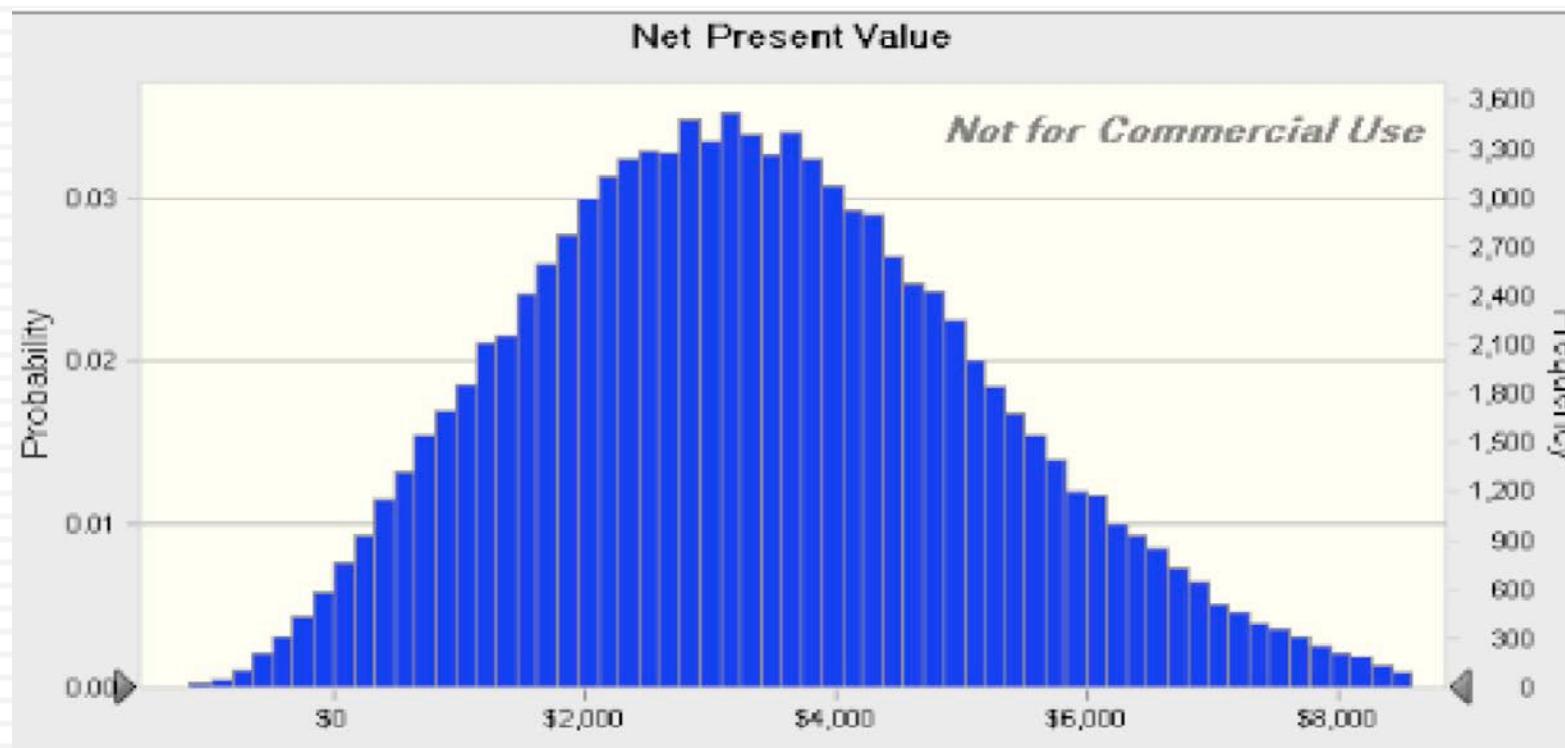


Country Risk Premium (Base Case = 3% (Brazil))



The resulting simulation...

Average = \$3.40 billion
Median = \$3.28 billion



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

You are the decision maker...

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- Assume that you are the person at Disney who is given the results of the simulation. The average and median NPV are close to your base case values of \$3.29 billion. However, there is a 10% probability that the project could have a negative NPV and that the NPV could be a large negative value? How would you use this information?
 - ▣ I would accept the investment and print the results of this simulation and file them away to show that I exercised due diligence.
 - ▣ I would reject the investment, because it is too risky (there is a 10% chance that it could be a bad project)
 - ▣ Other

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

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.

Financing Assumptions

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

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

The Hurdle Rate

255

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

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

Net Income: Vale Iron Ore Mine

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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
<i>Book Value and Depreciation</i>										
Beg. Book Value	\$1,250.00	\$1,050.00	\$890.00	\$762.00	\$659.60	\$577.68	\$512.14	\$446.61	\$381.07	\$315.54
- Depreciation	\$200.00	\$160.00	\$128.00	\$102.40	\$81.92	\$65.54	\$65.54	\$65.54	\$65.54	\$65.54
+ Capital Exp.	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
End Book Value	\$1,050.00	\$890.00	\$762.00	\$659.60	\$577.68	\$512.14	\$446.61	\$381.07	\$315.54	\$250.00
- Debt Outstanding	\$458.45	\$415.22	\$370.24	\$323.43	\$274.73	\$224.06	\$171.34	\$116.48	\$59.39	\$0.00
End Book Value of Equity	\$591.55	\$474.78	\$391.76	\$336.17	\$302.95	\$288.08	\$275.27	\$264.60	\$256.14	\$250.00

A ROE Analysis

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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%

From Project ROE to Firm ROE

258

- 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:
 - $\text{Equity Return Spread} = \text{Return on Equity} - \text{Cost of equity}$
- 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.

An Incremental CF Analysis

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

An Equity NPV

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

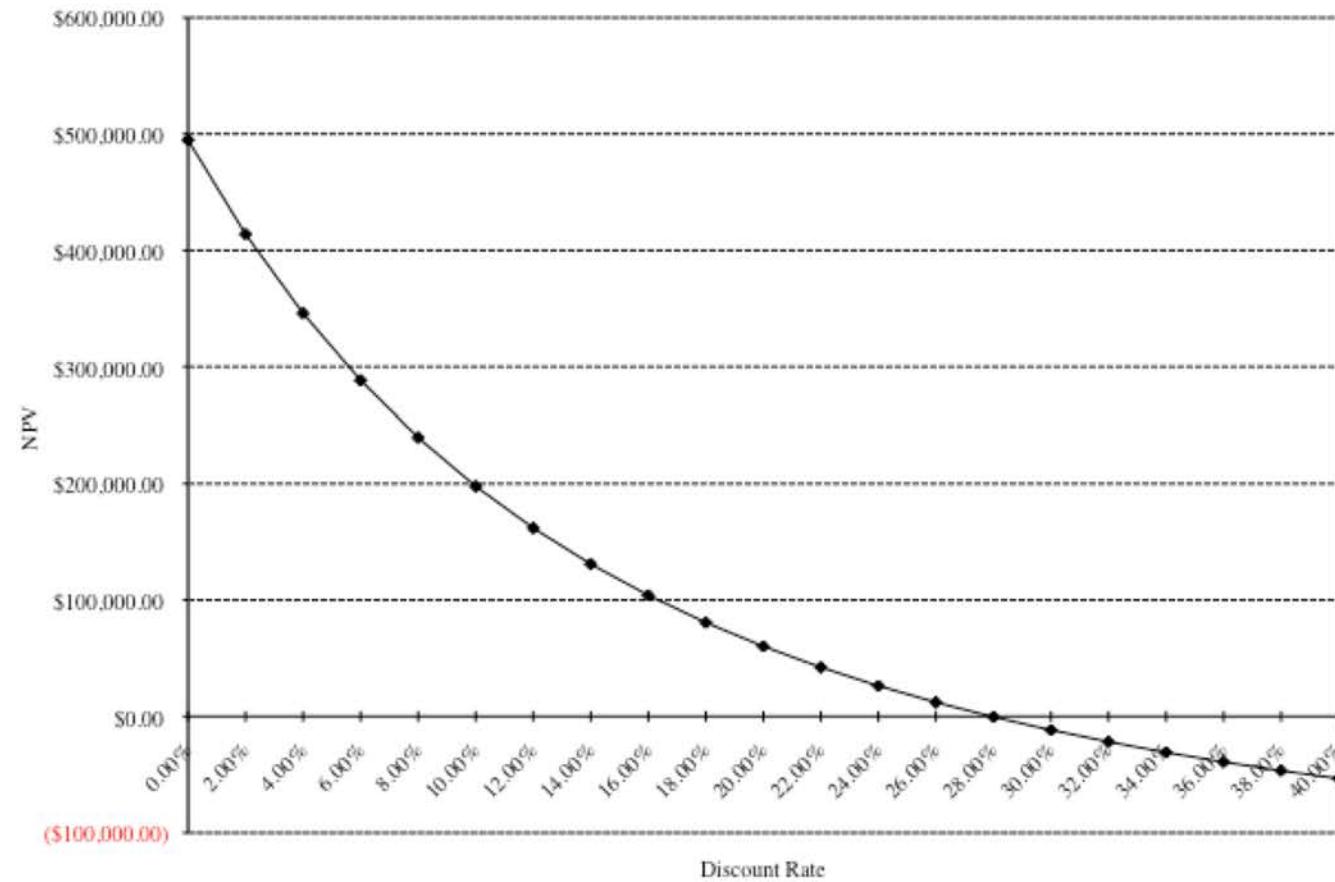
260

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

An Equity IRR

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Figure 5.6: NPV Profile on Equity Investment in Paper Plant: Aracruz



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?

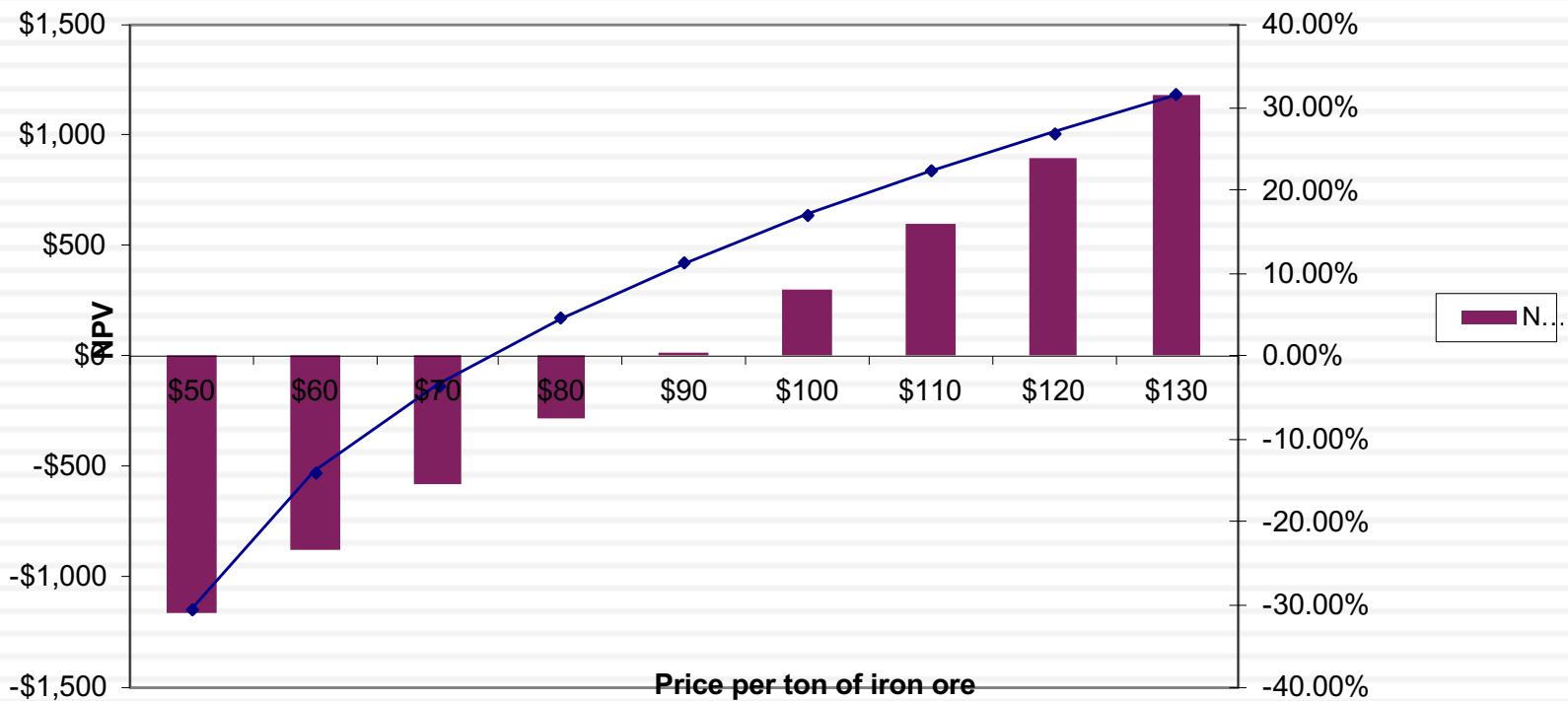
- Yes
- No
- Explain

Dealing with Macro Uncertainty: The Effect of Iron Ore Price

263

- 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.

Vale Paper Plant: Effect of Changing Iron Ore Prices

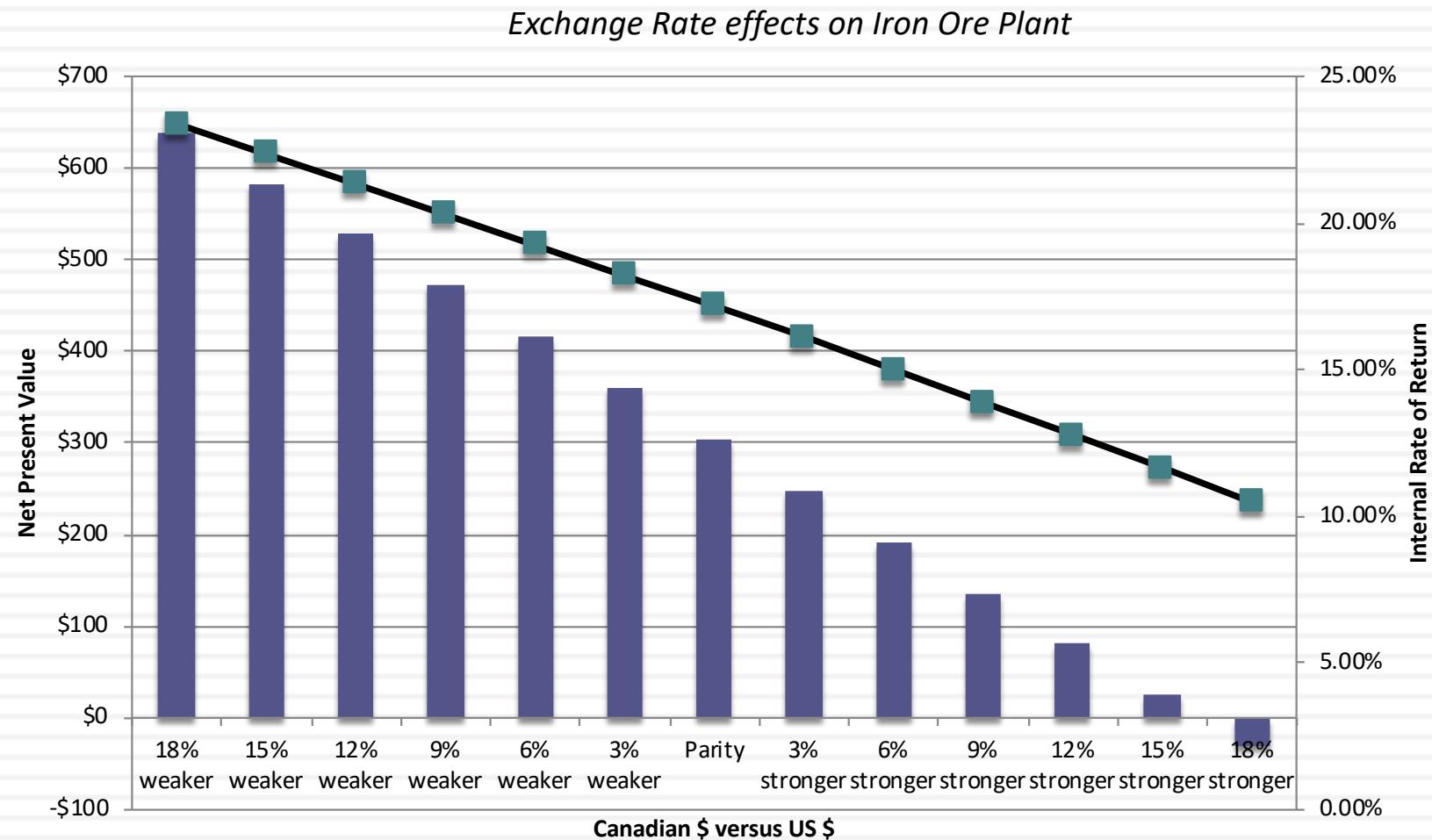


Aswath Damodaran

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And Exchange Rates...

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Should you hedge?

265

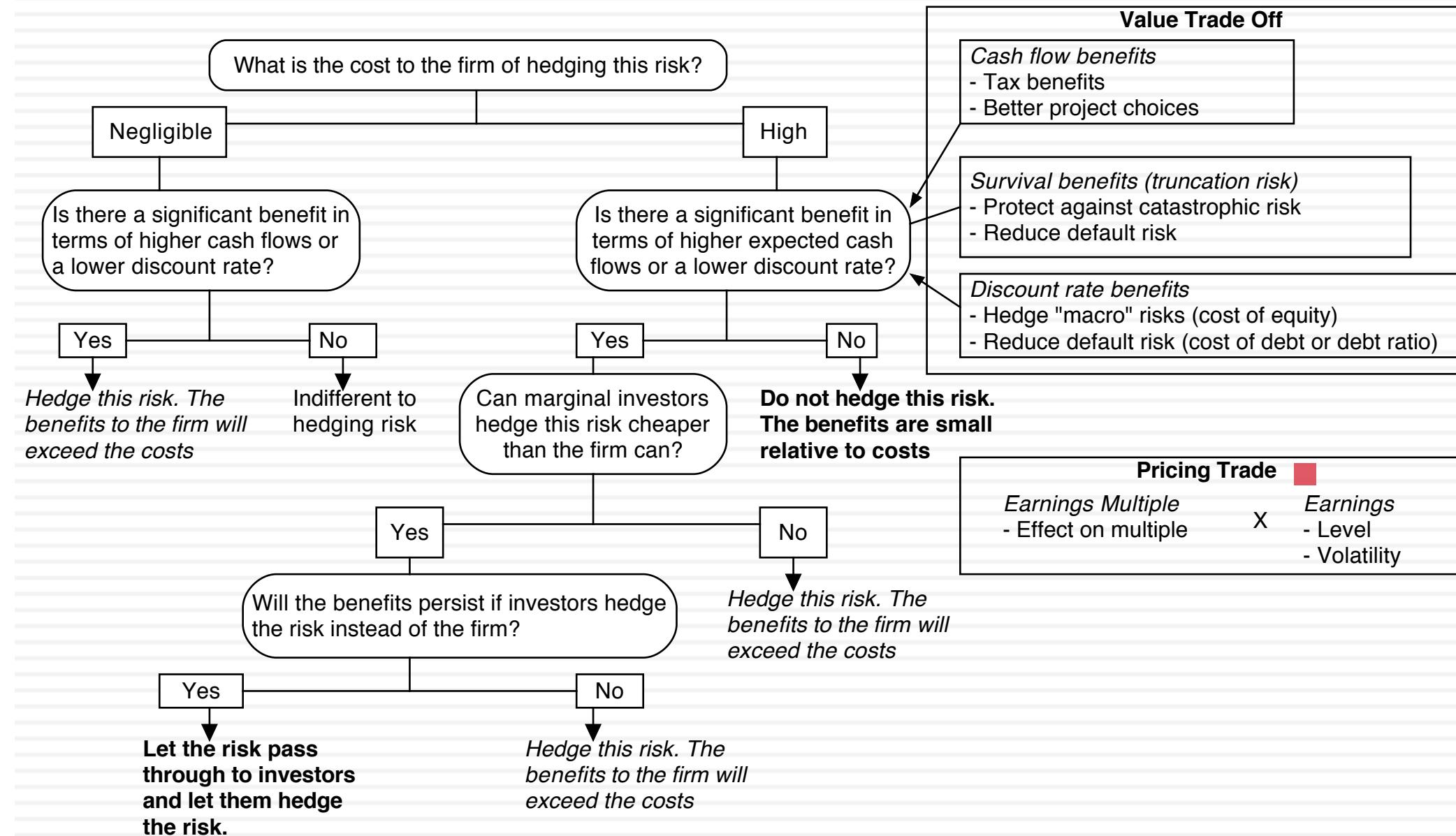
- The value of this mine is very much a function iron ore prices. There are futures, forward and option markets iron ore that Vale can use to hedge against price movements. Should it?
 - Yes
 - No

Explain.

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

Explain.

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



Acquisitions and Projects

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- An acquisition is an investment/project like any other and all of the rules that apply to traditional investments should apply to acquisitions as well. In other words, for an acquisition to make sense:
 - ▣ It should have positive NPV. The present value of the expected cash flows from the acquisition should exceed the price paid on the acquisition.
 - ▣ The IRR of the cash flows to the firm (equity) from the acquisition > Cost of capital (equity) on the acquisition
- In estimating the cash flows on the acquisition, we should count in any possible cash flows from synergy.
- The discount rate to assess the present value should be based upon the risk of the investment (target company) and not the entity considering the investment (acquiring company).

Tata Motors and Harman International

268

- Harman International is a publicly traded US firm that manufactures high end audio equipment. Tata Motors is an automobile company, based in India.
- Tata Motors is considering an acquisition of Harman, with an eye on using its audio equipment in its Indian automobiles, as optional upgrades on new cars.

Estimating the Cost of Capital for the Acquisition (no synergy)

269

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%
<i>Harman</i>	<i>\$4,298</i>		<i>100.00%</i>	<i>6.13%</i>

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).

$$\text{Levered Beta} = 1.17 (1 + (1 - .40) (.0798)) = 1.226$$

$$\text{Cost of Equity} = 2.75\% + 1.226 (6.13\%) = 10.26\%$$

$$\text{Cost of Capital} = 10.26\% (1 - 0.0739) + 4.75\% (1 - 0.40) (.0739) = 9.67\%$$

Estimating Cashflows- First Steps

270

- Operating Income: The firm reported operating income of \$201.25 million on revenues of \$4.30 billion for the year. Adding back non-recurring expenses (restructuring charge of \$83.2 million in 2013) and adjusting income for the conversion of operating lease commitments to debt, we estimated an adjusted operating income of \$313.2 million. The firm paid 18.21% of its income as taxes in 2013 and we will use this as the effective tax rate for the cash flows.
- Reinvestment: Depreciation in 2013 amounted to \$128.2 million, whereas capital expenditures and acquisitions for the year were \$206.4 million. Non-cash working capital increased by \$272.6 million during 2013 but was 13.54% of revenues in 2013.

Bringing in growth

271

- 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

Value of Harman International: Before Synergy

272

- 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.

$$\begin{aligned}\text{Value of Operating Assets} &= \frac{\text{Expected Cashflow to the firm next year}}{(\text{Cost of Capital} - \text{Stable growth rate})} \\ &= \frac{\$166.85}{(.0967 - .0275)} = \$2,476 \text{ million}\end{aligned}$$

- 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
= \$2,476 + \$ 515 - \$313 million = \$2,678 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 \$2750 million.

Measuring Investment Returns

II. Investment Interactions, Options and Remorse...

Life is too short for regrets, right?

Independent investments are the exception...

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- In all of the examples we have used so far, the investments that we have analyzed have stood alone. Thus, our job was a simple one. Assess the expected cash flows on the investment and discount them at the right discount rate.
- In the real world, most investments are not independent. Taking an investment can often mean rejecting another investment at one extreme (mutually exclusive) to being locked in to take an investment in the future (pre-requisite).
- More generally, accepting an investment can create side costs for a firm's existing investments in some cases and benefits for others.

I. Mutually Exclusive Investments

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- We have looked at how best to assess a stand-alone investment and concluded that a good investment will have positive NPV and generate accounting returns (ROC and ROE) and IRR that exceed your costs (capital and equity).
- In some cases, though, firms may have to choose between investments because
 - ▣ They are mutually exclusive: Taking one investment makes the other one redundant because they both serve the same purpose
 - ▣ The firm has limited capital and cannot take every good investment (i.e., investments with positive NPV or high IRR).
- Using the two standard discounted cash flow measures, NPV and IRR, can yield different choices when choosing between investments.

Comparing Projects with the same (or similar) lives..

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- When comparing and choosing between investments with the same lives, we can
 - ▣ Compute the accounting returns (ROC, ROE) of the investments and pick the one with the higher returns
 - ▣ Compute the NPV of the investments and pick the one with the higher NPV
 - ▣ Compute the IRR of the investments and pick the one with the higher IRR
- While it is easy to see why accounting return measures can give different rankings (and choices) than the discounted cash flow approaches, you would expect NPV and IRR to yield consistent results since they are both time-weighted, incremental cash flow return measures.

Case 1: IRR versus NPV

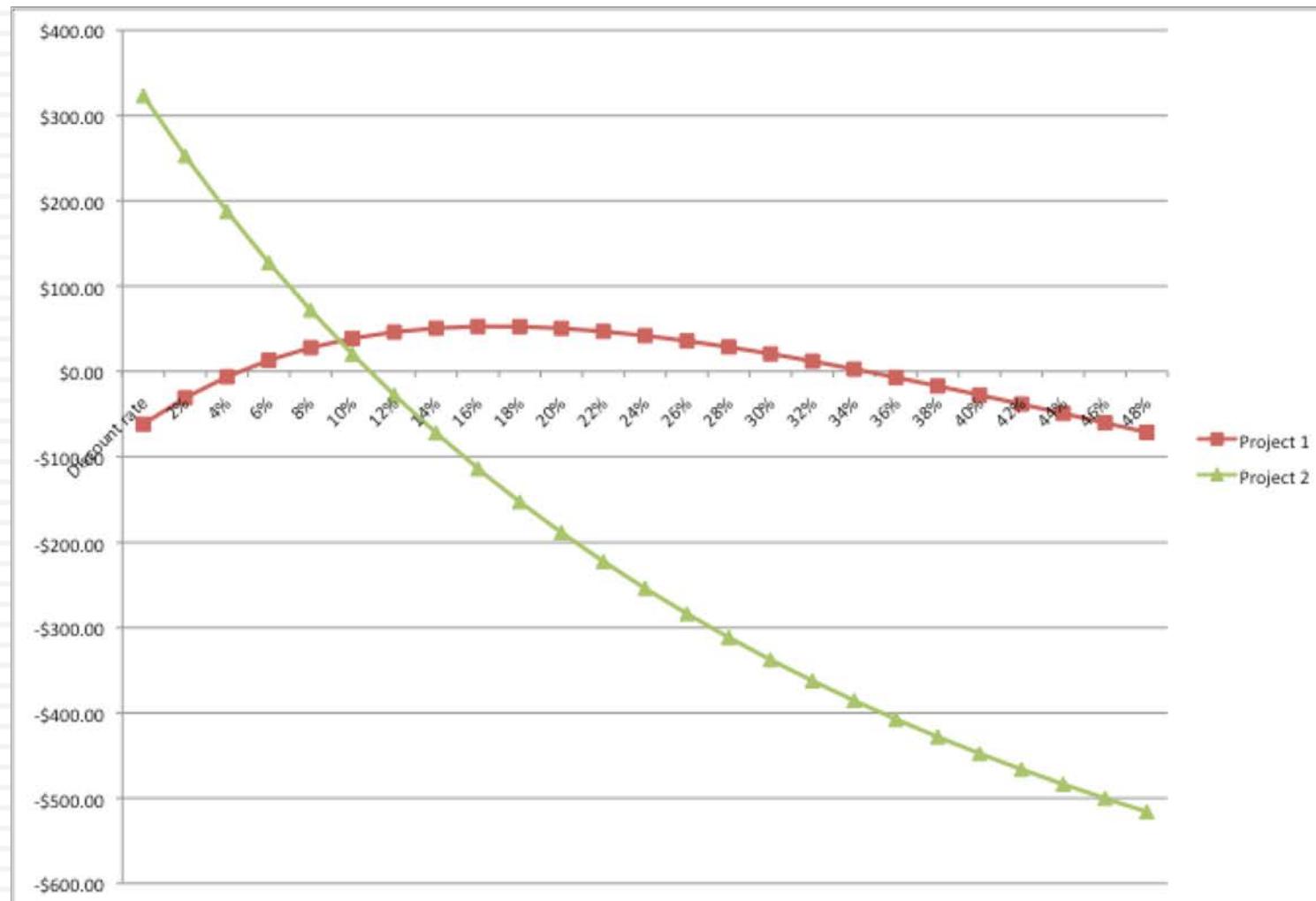
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- Consider two projects with the following cash flows:

Year	Project 1 CF	Project 2 CF
0	-1000	-1000
1	800	200
2	1000	300
3	1300	400
4	-2200	500

Project's NPV Profile

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What do we do now?

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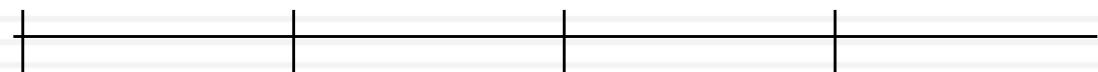
- Project 1 has two internal rates of return. The first is 6.60%, whereas the second is 36.55%. Project 2 has one internal rate of return, about 12.8%.
- Why are there two internal rates of return on project 1?

- If your cost of capital is 12%, which investment would you accept?
 - a. Project 1
 - b. Project 2
- Explain.

Case 2: NPV versus IRR

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Project A



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%

Which one would you pick?

281

- 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?

Capital Rationing, Uncertainty and Choosing a Rule

282

- 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.

The sources of capital rationing...

283

<i>Cause</i>	<i>Number of firms</i>	<i>Percent of total</i>
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

An Alternative to IRR with Capital Rationing

284

- 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.

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



Investment \$ 10,000,000

NPV = \$1,358,664
IRR = 20.88%

Why the difference?

286

- 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, IRR and the Reinvestment Rate Assumption

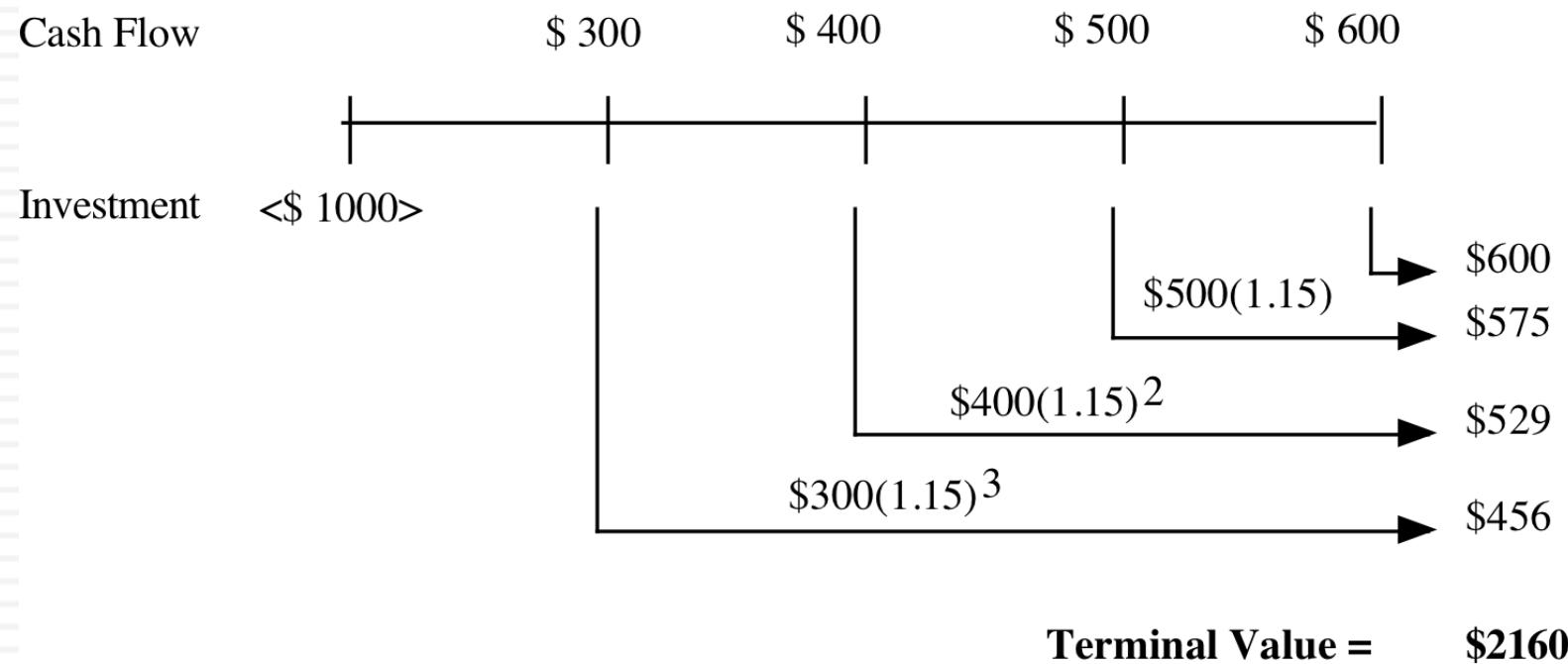
287

- 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.*

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%

Why NPV and IRR may differ.. Even if projects have the same lives

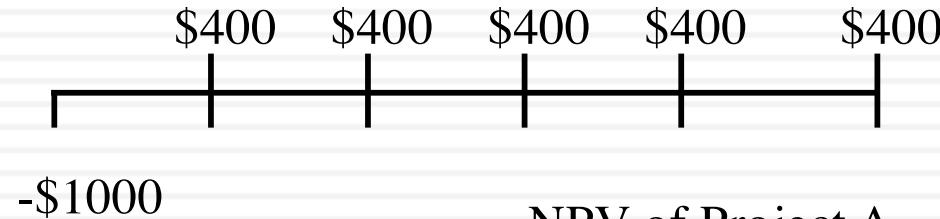
289

- 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”.

Comparing projects with different lives..

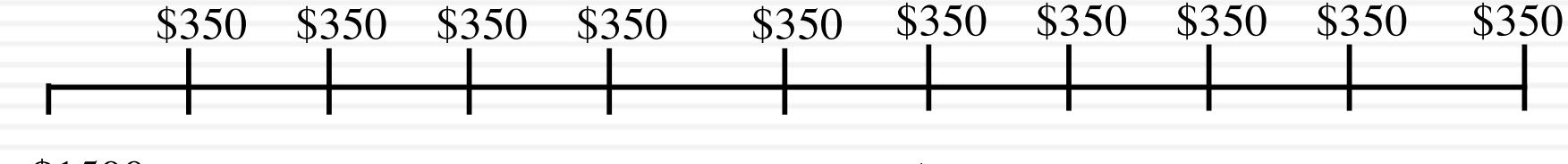
290

Project A



NPV of Project A = \$ 442
IRR of Project A = 28.7%

Project B



NPV of Project B = \$ 478
IRR for Project B = 19.4%

Hurdle Rate for Both Projects = 12%

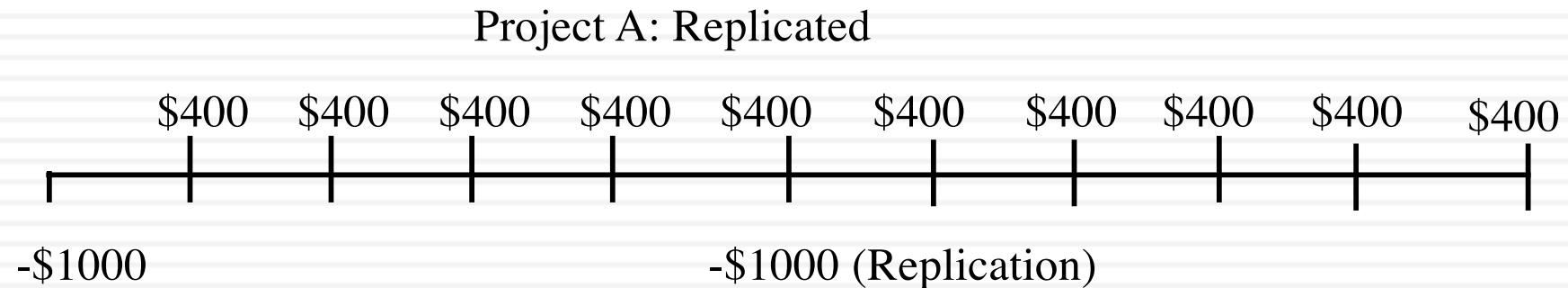
Why NPVs cannot be compared.. When projects have different lives.

291

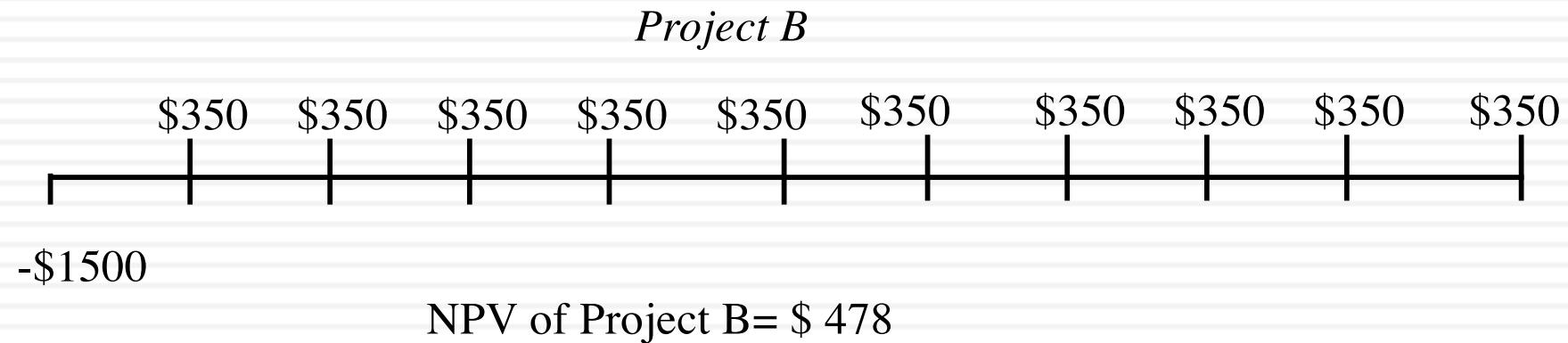
- The net present values of mutually exclusive projects with different lives cannot be compared, since there is a bias towards longer-life projects. To compare the NPV, we have to
 - ▣ replicate the projects till they have the same life (or)
 - ▣ convert the net present values into annuities
- The IRR is unaffected by project life. We can choose the project with the higher IRR.

Solution 1: Project Replication

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NPV of Project A replicated = \$ 693



NPV of Project B = \$ 478

Solution 2: Equivalent Annuities

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- Equivalent Annuity for 5-year project
 - $= \$442 * PV(A, 12\%, 5 \text{ years})$
 - $= \$ 122.62$
- Equivalent Annuity for 10-year project
 - $= \$478 * PV(A, 12\%, 10 \text{ years})$
 - $= \$ 84.60$

What would you choose as your investment tool?

294

- 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?

What firms actually use ..

295

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%

II. Side Costs and Benefits

296

- 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.

A. Opportunity Cost

297

- 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.

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:

Case 2: Incremental Cost? An Online Retailing Venture for Bookscape

299

- 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 be 10% 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%.

Cost of capital for investment

300

- 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.

$$\text{Levered Beta}_{\text{Online Service}} = 3.02 [1 + (1 - 0.4) (0.2141)] = 3.41$$

$$\text{Cost of Equity}_{\text{Online Service}} = 2.75\% + 3.41 (5.5\%) = 21.48\%$$

$$\text{Cost of Capital}_{\text{Online Service}} = 21.48\% (0.8237) + 4.05\% (1 - 0.4) (0.1763) = 18.12\%$$

- 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.

Incremental Cash flows on Investment

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	0	1	2	3	4
<i>Revenues</i>		\$1,500,000	\$1,800,000	\$1,980,000	\$2,178,000
<i>Operating Expenses</i>					
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

The side costs...

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- It is estimated that the additional business associated with online ordering and the administration of the service itself will add to the workload for the current general manager of the bookstore. As a consequence, the salary of the general manager will be increased from \$100,000 to \$120,000 next year; it is expected to grow 5 percent a year after that for the remaining three years of the online venture. After the online venture is ended in the fourth year, the manager's salary will revert back to its old levels.
- It is also estimated that Bookscape Online will utilize an office that is currently used to store financial records. The records will be moved to a bank vault, which will cost \$1000 a year to rent.

NPV with side costs...

303

- 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

Case 3: Excess Capacity

304

- 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

A Framework for Assessing The Cost of Using Excess Capacity

305

- 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

Product and Project Cannibalization: A Real Cost?

306

- 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

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.

Case 1: Adding a Café to a bookstore: Bookscape

308

- 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.

Case 2: Synergy in a merger..

309

- 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).

Estimating the cost of capital to use in valuing synergy..

310

- 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 = $9.6\% (1-0.3245) = 6.50\%$
 - Cost of capital in Rupees = $16.59\% (1-0.2928) + 6.50\% (0.2928) = 13.63\%$

Estimating the value of synergy... and what Tata can pay for Harman

311

- Value of synergy_{Year 3} =
$$\frac{\text{Expected Cash Flow}_{\text{Year 4}}}{(\text{Cost of Capital} - g)} = \frac{10,000}{(.1363 - .04)} = \text{Rs } 103,814 \text{ million}$$
- Value of synergy today =
$$\frac{\text{Value of Synergy}_{\text{Year 3}}}{(1 + \text{Cost of Capital})^3} = \frac{103,814}{(1.1363)^3} = \text{Rs } 70,753 \text{ million}$$
- 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 = \$2,678 million + \$1,179 million = \$3,857 million
- Since Harman's equity trades at \$5,248 million, the acquisition still does not make sense, even with the synergy incorporated into value.

III. Project Options

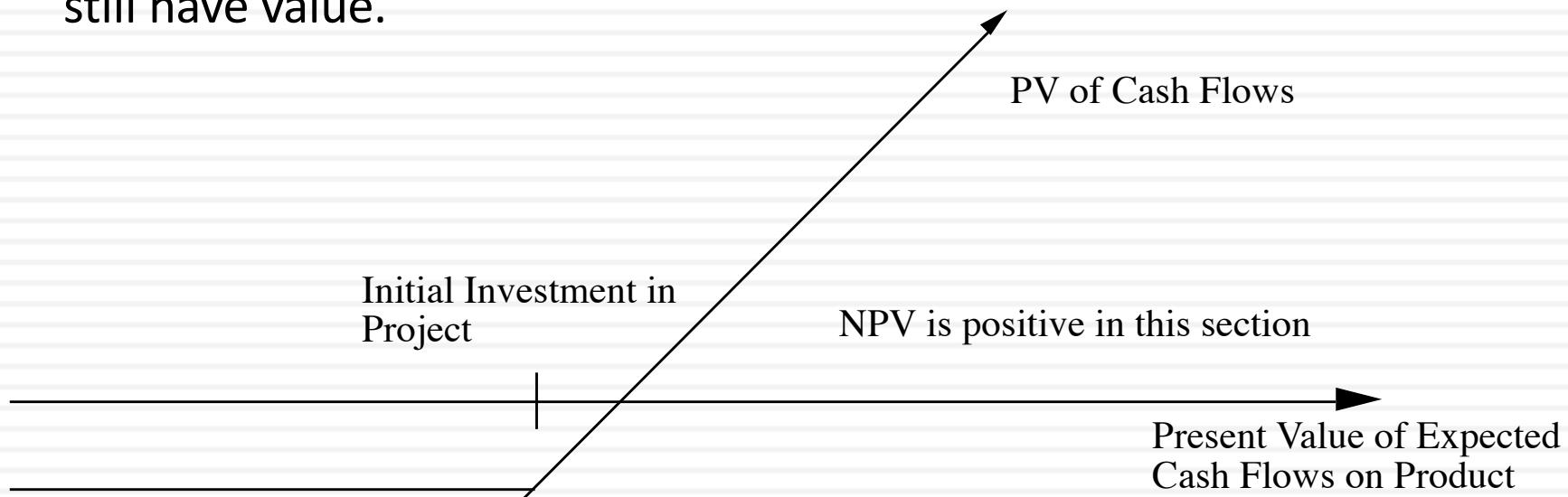
312

- 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.

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.



Insights for Investment Analyses

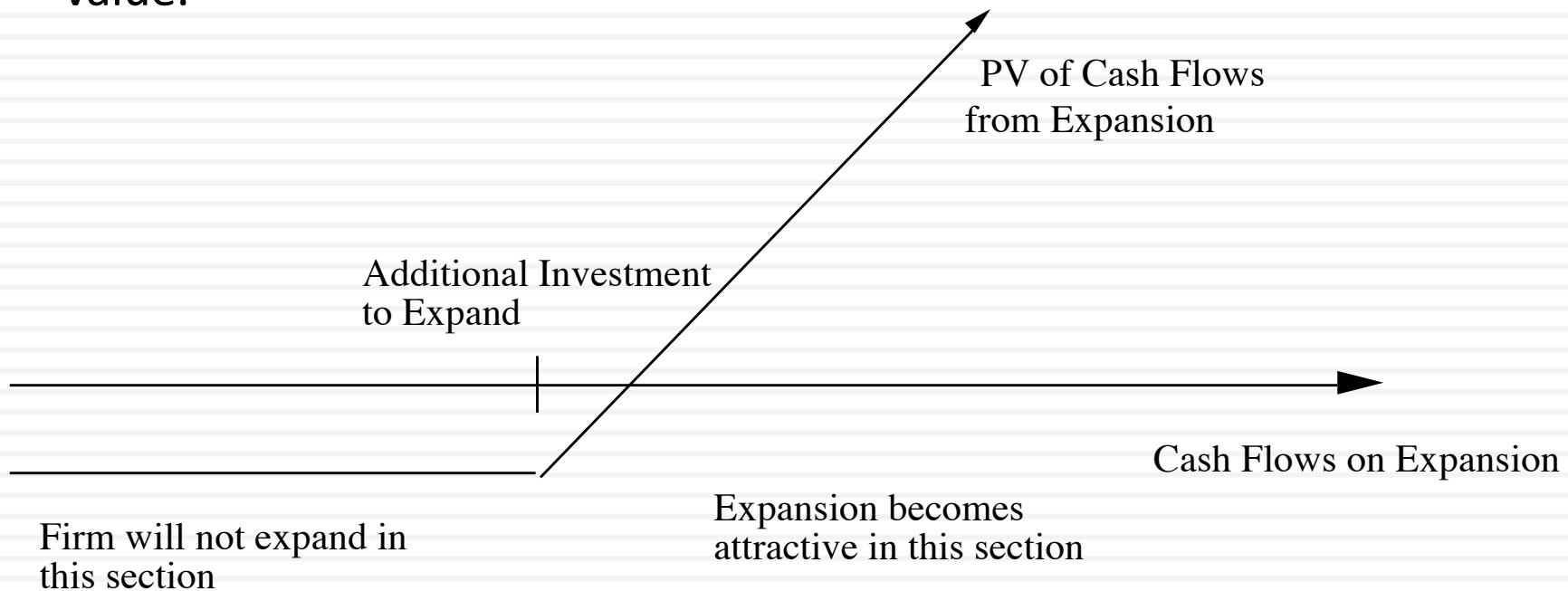
314

- 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 Option to Expand/Take Other Projects

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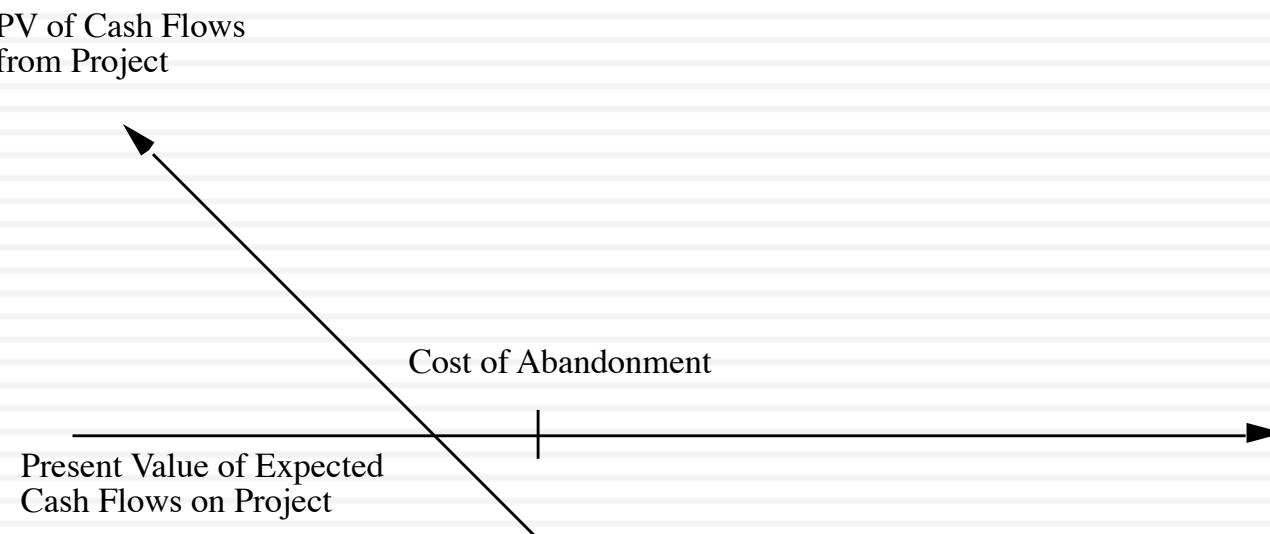
- Taking a project today may allow a firm to consider and take other valuable projects in the future. Thus, even though a project may have a negative NPV, it may be a project worth taking if the option it provides the firm (to take other projects in the future) has a more-than-compensating value.



The Option to Abandon

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- 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.



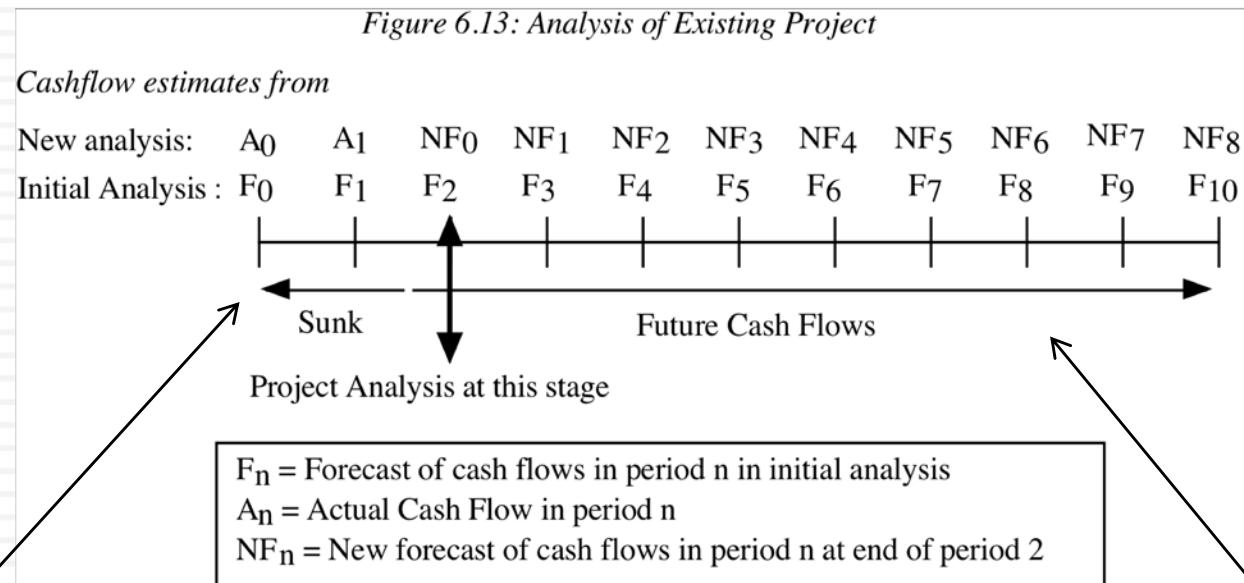
IV. Assessing Existing or Past investments...

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- While much of our discussion has been focused on analyzing new investments, the techniques and principles enunciated apply just as strongly to existing investments.
- With existing investments, we can try to address one of two questions:
 - ▣ Post –mortem: We can look back at existing investments and see if they have created value for the firm.
 - ▣ What next? We can also use the tools of investment analysis to see whether we should keep, expand or abandon existing investments.

Analyzing an Existing Investment

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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

a. Post Mortem Analysis

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- The actual cash flows from an investment can be greater than or less than originally forecast for a number of reasons but all these reasons can be categorized into two groups:
 - ▣ Chance: The nature of risk is that actual outcomes can be different from expectations. Even when forecasts are based upon the best of information, they will invariably be wrong in hindsight because of unexpected shifts in both macro (inflation, interest rates, economic growth) and micro (competitors, company) variables.
 - ▣ Bias: If the original forecasts were biased, the actual numbers will be different from expectations. The evidence on capital budgeting is that managers tend to be over-optimistic about cash flows and the bias is worse with over-confident managers.
- While it is impossible to tell on an individual project whether chance or bias is to blame, there is a way to tell across projects and across time. If chance is the culprit, there should be symmetry in the errors – actuals should be about as likely to beat forecasts as they are to come under forecasts. If bias is the reason, the errors will tend to be in one direction.

b. What should we do next?

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$$\sum_{t=0}^{t=n} \frac{NF_n}{(1+r)^n} < 0 \quad \dots \dots \quad \text{Liquidate the project}$$

$$\sum_{t=0}^{t=n} \frac{NF_n}{(1+r)^n} < \text{Salvage Value} \quad \dots \dots \quad \text{Terminate the project}$$

$$\sum_{t=0}^{t=n} \frac{NF_n}{(1+r)^n} < \text{Divestiture Value} \quad \dots \dots \quad \text{Divest the project}$$

$$\sum_{t=0}^{t=n} \frac{NF_n}{(1+r)^n} > 0 > \text{Divestiture Value} \quad \dots \dots \quad \text{Continue the project}$$

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 rides and 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 park, 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: 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

$$\text{Value of DCA} = \frac{\text{Expected Cash Flow next year}}{(\text{Cost of capital} - g)} = \frac{50(1.02)}{(.0662 - .02)} = \$1.103 \text{ billion}$$

- Abandonment: Abandoning this investment currently would allow Disney to recover only \$ 500 million of its original investment.

$$\text{Abandonment value of DCA} = \$ 500 \text{ million}$$

- 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.

$$\text{Value of CF from expansion} = \frac{\text{Increase in CF next year}}{(\text{Cost of capital} - g)} = \frac{30(1.02)}{(.0662 - .02)} = \$662 \text{ million}$$

First Principles

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