The Economics of Corporate Finance

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THESE SLIDES ARE PRELIMINARY UNTIL END OF TERM

Contents

What are corporations?

1. a way of organising people to produce goods and services
   - (micro) production function: $K, L \Rightarrow$ goods and services
   - (finance) a set of real assets bought by selling financial liabilities
   - (us) a set of projects
2. a way of making economic activity independent of individuals
   - an independent legal person $\neq$ sole proprietorship, limited liability company
   - contributed to Western Europe's economic rise [Kuran, 2004]?

- distinguishing features
  - owners (shareholders) are not necessarily the managers
    - shareholders elect Board of Directors
    - typically, 1 share = 1 vote (unlike mutual society)
    - executive members are also managers (e.g. CEO); non-exec are not
    - then, managers and other staff
  - agency problems due to asymmetric information
  - closely held (e.g. family) or widely (public)
  - limited liability (unlike a partnership)

Employment size of (US) firms

# employees	# firms
1 − 4	3,617,764
5 − 10	1,044,065
10 − 19	633,141
20 − 99	526,307
100 − 499	90,386
500 − 749	6,060
750 − 999	3,038
1,000 - 1,499	3,044
1,500 − 1,999	1,533
2,000 − 2,499	904
2,500 − 4,999	1,934
5,000 − 9,999	975
≥ 10,000	981

Table 2a. Employment Size of Employer and Nonemployer Firms, 2008

What is corporate finance?

the field of finance dealing with financial decisions that business enterprises make and the tools and analysis used to make these decisions. (Wikipedia, 14/01/11)

1. **investment decision**: when should a project be undertaken? ▸ NPV
2. **financing decision**: how should a project be financed?
3. **dividend decision**: when should cash be returned to shareholders?
   - should BP (the UK's largest divident payer) have suspended payments for 2010-H2?

What is the economics of corporate finance?

1. how ensure the right decisions are made?
   1. investment decision
      - why might $NPV > 0$ projects not be undertaken?
      - why might $NPV < 0$ projects be undertaken?
   2. financing decision: why might the capital structure be wrong?
   3. dividend decision: why might shareholders be paid too little or much?
2. who should understand the economics of corporate finance?
   1. corporate financial manager making good decisions for your firm
   2. financial analyst interpreting a firm's decisions for your investors
      - May 1997: would you have advised buying Amazon?
   3. regulator ensuring a firm operates in society's interests
      - Jan 2012: should Tokyo Stock Exchange delist Olympus?
3. explicit economic focus
   - not accounting: largely assume 'the numbers' are right
   - not management: don't address implementation
   - big picture look at incentives, information, institutions

Some specific questions we'll gain insight into

1. does it matter whether capital is raised by issuing equity or debt?
2. why do firms issue relatively more equity than debt before periods of low returns?
3. why were the share prices of large US oil firms negatively correlated with exploration announcements in the late 1970s?
4. are markets efficient?

Mean proportion of investment finance, by source (1999)

	external	bank	equity	leasing	credit	aid bank	informal
Brazil	51.8	23.1	6.9	4.7	11.4	4.2	0.4
Canada	48.6	23.4	8.4	2.4	3.4	5.9	5.0
China	29.9	10.2	2.4	1.6	2.4	4.6	5.9
France	30.9	6.8	5.8	4.3	7.4	1.4	1.7
Germany	54.3	16.8	23.1	0.7	0.9	8.5	4.1
Indonesia	21.8	17.2	0.0	1.7	0.7	1.7	0.0
Italy	77.7	49.7	6.9	1.7	5.8	1.2	4.2
UK	36.1	13.1	11.6	2.9	7.5	0.6	0.5
US	47.1	21.5	3.2	6.1	6.6	6.8	2.9

Source: Beck et al. [2008] ◂ free cash

- except Italy, internal cash flow (inc. retained earnings) largest single source
- only in UK, Germany does equity rival bank debt as an external source
- small firms use less external finance (due to restricted bank finance)

Median debt-to-capital ratios, 1991

	Debt to total capital, %			
	Book	Book, adjusted	Market	Market, adjusted
Canada	39	37	35	32
France	48	34	41	28
Germany	38	18	23	15
Italy	47	39	46	36
Japan	53	37	29	17
UK	28	16	19	11
US	37	33	28	23

Source: Rajan and Zingales via ★ Myers [2001]

- book (or accounting) values taken from firms' official reports
- market values from the market
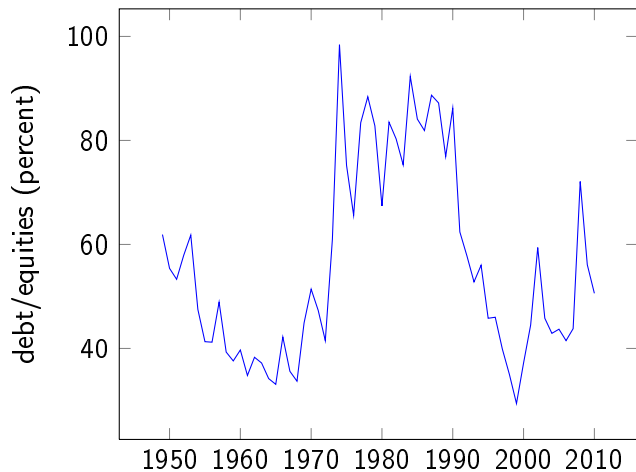- apparent variation in debt use due to differing definitions

Leverage ratios

	mean	median
Brazil	.162	.136
Canada	.150	.128
China	.170	.047
France	.097	.073
Germany	.072	.040
India	.222	.183
Indonesia	.189	.148
Italy	.080	.054
Japan	.108	.084
Korea	.164	.173
UK	.084	.056
US	.144	.093

Book value of long term debt over market value of total assets, 1997 - 2001 [de Jong et al., 2008]

	median
Brazil	.44
Canada	.16
China	.24
France	.28
Germany	.19
India	.36
Indonesia	.45
Italy	.33
Japan	.33
Korea	.52
UK	.17
US	.16

Total debt over market value, 1991 - 2006 [Fan et al., forthcoming]
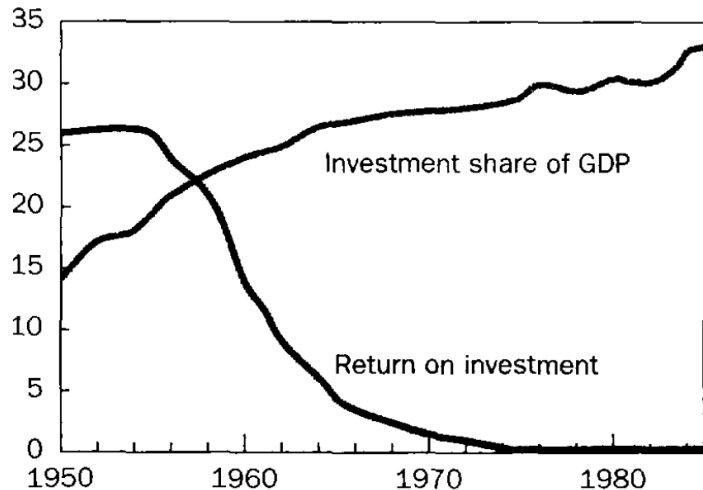
US nonfarm nonfinancials

B.102, line 37, US Federal Reserve Flow of Funds accounts

US nonfarm nonfinancials [Myers, 2001, ★]

1. "smaller, riskier and more rapidly growing firms" usually "rely heavily on stock issues"
   - "net stock issues are frequently negative" (repurchase shares)
2. "large, integrated oil companies . . . relied mostly on debt for external financing"
3. "utility, chemical, transportation, telecommunications, forest products, and real estate development industries" also heavily debt issuers
4. "major pharmaceutical companies typically operate at negative debt ratios"
   - low or negative debt ratios usually due to high profitability, risk, growth opportunities, importance of intangible assets

Investment and rates of return in Soviet industry

Percent

Investment share of GDP

Return on investment

Source: World Bank (1996), World Development Report; data from
Easterly and Fischer [1994]

Changes in US real GDP during the credit crisis (2005 $bn)

	2008-I	2008-II	2008-III	2008-IV	2009-I	2009-II	2009-III	2009-IV
C	0	10	-40	-57	-80	-109	-108	-84
I	0	-33	-134	-342	-522	-574	-521	-529
G	0	20	52	62	42	80	90	81
$X - M$	0	36	15	52	141	188	139	200
GDP	0	20	-116	-346	-507	-529	-478	-320

Source: US National Income and Product Accounts, Table 1.1.6 [Hall, 2010]

Overview of MM capital structure irrelevance

- does it matter how a profitable project is financed?
- if two firms differ only in their capital structures, do their market values differ?
- MM important result for two reasons:
  1. challenged conventional wisdom
  2. introduced formal proof techniques to finance ($\therefore$ clarified logic)
     - state assumptions (necessary v. sufficient conditions)
     - prove conclusions
  3. established framework for modern corporate finance
- verbal intuition: Yogi Berra joke
- algebraic intuition: given a debt repayment D and a project return R, the value of equity V_E and debt V_D is
  $V \equiv V_E + V_D = \mathbb{E}\left(\max\left\{0, R - D\right\}\right) + \mathbb{E}\left(\min\left\{R, D\right\}\right) = \mathbb{E}\left(R\right)$

Sources and reading material

- Modigliani and Miller [1958] is the original paper
- Modigliani and Miller [1961] extended the reasoning to dividend payments
- Stiglitz [1969] simplified the original logic, removing the need for 'risk classes' and clarifying the importance of bankruptcy
- Stiglitz [1974] analysed a multi-period version of Modigliani and Miller [1958], extending the results to richer classes of assets
- Miller [1988] reflected on the propositions and their significance 30 years later

1: Perfect capital markets

There are no transactions costs to investors and firms when they issue or trade securities; bankruptcy likewise involves no costs; there are no taxes; and there are no [agency] costs in keeping a firm's management to the decision rules set by its security holders.

2: Equal access

Individuals and firms have equal access to the capital market. This means that the types of securities that can be issued by firms can be issued by investors on personal account. *For example, suppose an investor owns the same proportion of each of a firm's securities, so that he has a direct share in the firm's activities. Equal access implies that, using the firm's securities as exclusive collateral, the investor can issue the same sort of securities as the firm. If firms can issue securities that contain limited liability provisions, such provisions can also be included in securities issued by investors against their holdings in firms. Moreover, the* prices of securities are determined by the characteristics of their payoff streams and not by whether they are issued by investors or firms.

3: Complete Agreement or Homogeneous Expectations

Any information available is costlessly available to all market agents (investors and firms), and all agents correctly assess the implications of the information for the future prospects of firms and securities.

4: Only Wealth Counts

Aside from effects on security holder wealth, the financing decisions of a firm do not affect the characteristics of the portfolio opportunities available to investors. Thus the effects of a firm's financing decisions on the welfare of its security holders can be equated with effects on security holder wealth.

- e.g. financing decisions do not have general equilibrium effects, including through market power

5: Given Investment Strategies

Although decisions to be made in the future are unknown, the rules that firms use to make current and future investment decisions are given. In addition, *investment decisions are made independently of how the decisions are financed.*

- e.g. 'fund projects with $NPV > 0$'
- in particular, changes in capital structure do not lead to changes in the importance given to shareholder v. bondholder value
- but asset holders may not be indifferent to financing decisions: new debt may impose default risk, shifting value from old bondholders

Comments on assumptions

Equal access could logically be included as a characteristic of a perfect capital market, but it plays such an important role in capital structure propositions that it is stated separately. . . . A perfect capital market could be taken to imply complete agreement, but it is common in the literature to state the two as separate assumptions. . . . For most of what we do, it would be sufficient to assume that all market agents can correctly determine when securities issued by different investors and firms are perfect substitutes, but it seems at best a short step from this to complete agreement. . . . one of the contributions of more recent treatments of capital structure propositions is to show that [the only wealth counts] assumption is unnecessary. ★ [Fama, 1978]

The arbitrage principle

An economics professor and Yankee farmer were waiting for a bus in New Hampshire. To pass the time, the farmer suggested that they play a game. "What kind of game would you like to play?" responded the professor. "Well," said the farmer, "how about this: I'll ask a question, and if you can't answer my question, you give me a dollar. Then you ask me a question and if I can't answer your question, I'll give you a dollar."

"That sounds attractive," said the professor, "but I do have to warn you of something: I'm not just an ordinary person. I'm a professor of economics.

"Oh," replied the farmer, "In that case we should change the rules. Tell you what: if you can't answer my question you still give me a dollar, but if I can't answer yours, I only have to give you fifty cents."

"Yes," said the professor, "that sounds like a fair arrangement."

"Okay," said the farmer, "Here's my question: what goes up the hill on seven legs and down on three legs?"

The professor pondered this riddle for a little while and finally replied. "Gosh, I don't know . . . what does go up the hill on seven legs and down on three legs?"

"Well," said the farmer, "I don't know either. But if you give me your dollar, I'll give you my fifty cents!" [Varian, 1987]

Verbal intuition for MM capital structure irrelevance

Theorem

Under the assumptions above, "the market value of a firm is unaffected by its financing decisions." ★ [Fama, 1978]
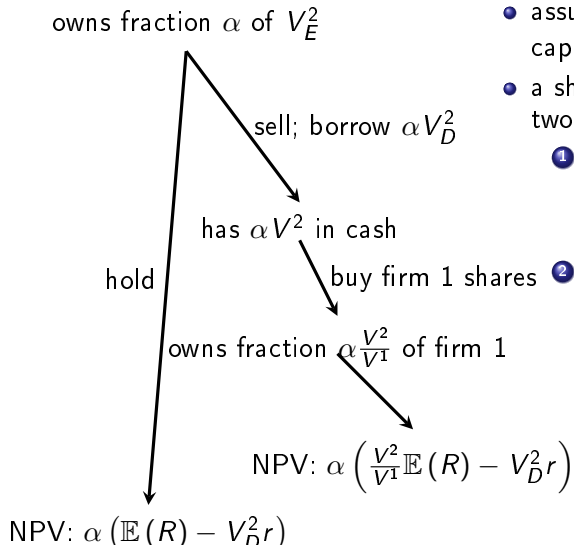
★ Fama [1978] summarises Stiglitz [1974]:

1. let there be an optimal capital structure, which the firm does not pick
   - e.g. $V^* = V_E^* + V_D^* = 40 + 80 > V = V_E + V_D = 50 + 50$
2. by equal access, an investor can buy equal proportions of the firm's securities and costlessly issue the optimal proportion
3. if the market value of the optimal capital structure is higher than the firm's, an arbitrage opportunity exists
4. as equal access allows anyone to exploit this arbitrage opportunity, it can't exist in equilibrium
5. instead, agents buying the firm's securities will bid up their prices, restoring equality
6. thus, whatever the capital structure, the firm's value is always optimal

Formalising the verbal argument

Suppose there are two firms:

1. both have made identical investments, which earn returns $\mathbb{E}(R)$
2. V_E^f: market value of firm f's equity
3. V_D^f: market value of firm f's debt
4. $\therefore V^f = V_E^f + V_D^f$: total value of firm f
5. firm 1 is only financed by equity: $V^1 = V_E^1$ (not geared, unleveraged)
6. firm 2 has debt: $V^2 = V_E^2 + V_D^2$ (geared, leveraged)
7. bondholders are repaid at interest rate r

- how is the market value of debt and equity assessed?

Proof by contradiction

owns fraction α of V_E^2

sell; borrow αV_D^2

has αV^2 in cash

hold   buy firm 1 shares

owns fraction $\alpha \frac{V^2}{V^1}$ of firm 1

NPV: $\alpha \left(\frac{V^2}{V^1} \mathbb{E}\left(R\right) - V_D^2 r \right)$

NPV: $\alpha \left(\mathbb{E}\left(R\right) - V_D^2 r \right)$

- assume $V^2 > V^1$: firm 1's capital structure is not optimal
- a shareholder in firm 2 considers two (of *many*) strategies
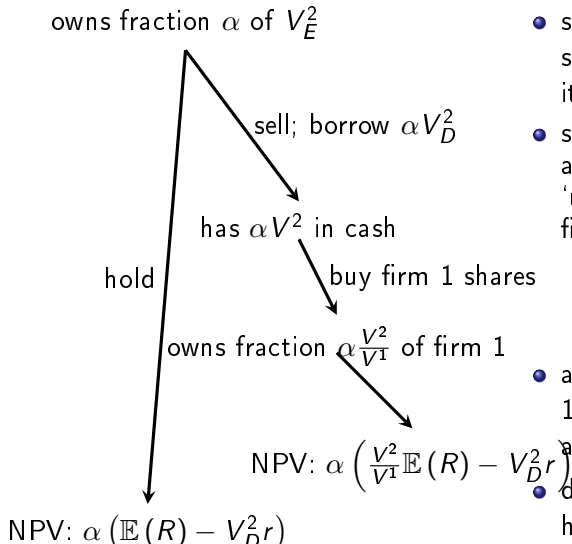 1. holding the shares yields

  $$\alpha \left(\mathbb{E}\left(R\right) - V_D^2 r \right)$$

  2. 'replication' route:
     1. sell its shares to earn αV_E^2
     2. borrow αV_D^2 at rate r
     3. now has αV^2 in cash
     4. buy fraction $\alpha \frac{V^2}{V^1}$ of firm 1's shares
     5. NPV of strategy

     $$\alpha \left(\frac{V^2}{V^1} \mathbb{E}\left(R\right) - V_D^2 r \right)$$

Proof by contradiction

owns fraction α of V_E^2

sell; borrow αV_D^2

has αV^2 in cash

hold

buy firm 1 shares

owns fraction $\alpha \frac{V^2}{V^1}$ of firm 1

NPV: $\alpha \left(\frac{V^2}{V^1} \mathbb{E}(R) - V_D^2 r \right)$

NPV: $\alpha \left(\mathbb{E}(R) - V_D^2 r \right)$

- shareholder buying firm 1 shares owns a fraction of its project
- shareholder finances it by a mix of debt and equity, 'undoing' firm 1's financing:
  - selling firm 2 shares 'issued' equity
  - borrowing issued debt
- any agent (including firm 1) could exploit this arbitrage opportunity
- demand drives up V_E^1, hence V^1

Can rule out $V^1 > V^2$ similarly

owns fraction α of firm 1

sell it

has $\alpha V_E^1 = \alpha V^1$ in cash

keep it

buy firm 2 shares, debt

Can this two firm argument be re-written with a single firm?

owns fraction $\frac{\alpha V^1}{V^2}$ of firm 2's shares, debt

NPV: $\alpha \left[\frac{V^1}{V^2} \left(\mathbb{E}(R) - V_D^2 r \right) + \frac{V^1}{V^2} V_D^2 r \right]$

NPV: $\alpha \mathbb{E}(R)$

Related results

Theorem (MM dividend irrelevance)

Under the MM assumptions, a firm's choice of dividend policy is irrelevant and does not affect the initial share price. [Modigliani and Miller, 1961]

- intuition: shareholder can replicate dividend stream by selling shares

  "There was a time in the 90s when dividend was a four-letter word," says Jim Cullen, a Boston fund manager. "They were for old ladies." . . . [Apple] has never yet paid a dividend. (FT, 30/01/12)

Example (Ricardian equivalence)

- irrelevant whether government finances activities by taxes or debt
- reducing government debt (e.g. privatisation) is of no intrinsic benefit

- if MM holds, the level of household savings irrelevant [Stiglitz, 1974]

For *regulators and policymakers*, the Modigliani and Miller propositions are the *ideal end result*. If that result could be achieved in practice, then investors' diverse demands for specialized securities would be satisfied at negligible cost. All firms would have equal access to capital, and the cost of capital would not depend on financing, but only on business risk. Capital would flow directly to its most efficient use. Therefore public policy should accommodate financial innovation because it makes financing decisions unimportant.

But for *students or practitioners* of corporate finance, the Modigliani and Miller propositions are *benchmarks*, not end results. The propositions say that financing does not affect value except for specifically identified costs or imperfections. [Myers, 2001, ★]

showing what doesn't matter can also show, by implication, what does. [Miller, 1988]

FT banking reforms debate

David Miles (Monetary Policy Committee): the so-called Modigliani Miller theorem - suggests that the impact of lower leverage is such that the effect on bank funding from raising what looks like "expensive" equity is actually close to zero. (23/11/10)

Martin Hellwig (Max Planck Inst): Modigliani and Miller . . . [claim] that capital structure matters because of factors such as taxes and subsidies, bankruptcy costs and moral hazard, . . . because of those very factors, there is a difference between the private and social costs of bank equity. (02/12/10)

Anat Admati (Stanford GSB): Messrs Pandit, Barwell, Gleeson and Samuels must do more than dismiss arguments as theoretical and raise vague and unsubstantiated threats to global growth and the economy. They must explain precisely what forces should lead society away from imposing high equity requirements on banks and how such an effect comes about. (02/12/10)

Richard Barwell (RBS): the key question is whether MM fails because financial markets are inefficient, because the answer to that question has implications for the debate that is about to begin on macroprudential policy rather than one that is largely settled on regulatory policy. (08/12/10)

Life after MM

There is no universal theory of the debt-equity choice, and no reason to expect one. There are several useful conditional theories, however. . . . The logic of the Modigliani and Miller (1958) results is now widely accepted. *Nevertheless,* financing clearly can matter. *. . . The* tradeoff theory *emphasizes taxes, the* pecking order theory *emphasizes differences in information, and the* free cash flow theory *emphasizes agency costs. [Myers, 2001, ★]*

- is this too pessimistic?
    1. Décamps et al. [2008]: both transaction and agency costs
    2. Malmendier [2010]: managerial characteristics and agency issues

    managerial overconfidence appears to provide a unifying framework for some of the major empirical puzzles in Corporate Finance

publicly traded companies often issue new shares by organizing a seasoned equity offering (SEO) . . . Smith (1977) estimates direct underwriting costs for US corporations from 1971 to 1975 to be 6.17% on average, rising to 13.74% for smaller issues. . . . Lee, Lochhead, Ritter, and Zhao (1996) report the average costs of raising capital for US corporations from 1990 to 1994, and find that the direct costs of SEOs vary from 3.15% of the proceeds of the issuing (for large issues), to 13.28% (for small issues), with an average of 7.11%. [Décamps et al., 2008]

Underwriting and other issue costs are actually lower for debt than for equity. [Myers, 2001, ★]

Example

Glencore is facing a big increase in its tax bill following its $60bn initial public offering after paying almost no corporate taxes on its trading business for years in spite of bumper profits ...
"Under the current private structure, [the trading business of] Glencore has been largely tax free," Liam Fitzpatrick, the lead analyst for Credit Suisse, wrote in a report.
Glencore declined to comment. (FT, 27/04/11)

Example

Twenty-five of the 100 highest paid U.S. CEOs earned more last year than their companies paid in federal income tax ... many of the companies spent more on lobbying than they did on taxes. ...
Several companies mentioned in the report took issue with its methodology and said they paid all taxes owed.
... Scott Dyreng ... at Duke's Fuqua School of Business who studies corporate taxes, [said] though companies could disclose that figure, don't have to and don't do so. (Reuters, 31/08/11)

Tradeoff theory

firms seek debt levels that balance the tax advantages of additional debt against the costs of possible financial distress. The tradeoff theory predicts moderate borrowing by tax-paying firms. [Myers, 2001, ★]

- often: corporate income taxed, but debt interest payments tax-deductible expense
- paying more interest earns 'interest tax shield' (lower taxes), ⇑ NPV
- hold debt so marginal benefit of shield = marginal cost of financial distress (bankruptcy, reorganisation, doubts about creditworthiness)
- evidence weak [Myers, 2001, ★]
  1. US firms could have added 7.5% to value by taking more debt
  2. most profitable borrow least (opposite to expected)
- investors may have equity shields
  - capital gains rate may be < interest income rate, can be shifted in time
  - [Myers, 2001, ★,p.87] works example
- Graham [2011] concludes that taxes matter, but not a lot

David Walker (Morgan Stanley): The continuing bias towards encouraging leverage in banks, private equity groups and hedge funds - because debt interest is deductible and equity dividends are not - is commonly disregarded. ...Reducing the *tax deductibility of debt interest* (TDI) lacks populist appeal, raises complex issues, could be implemented only gradually and would face huge obstacles even in the case of a big economy with little international harmonisation. Yet maintaining TDI seems perverse at a time when policymakers are committed to reducing leverage and boosting the equity base of financial entities. (FT, 27/05/10)

Willem Buiter (LSE): Taper relief has no more justification on grounds of efficiency or fairness than would tape worm relief. ...Through trivially simple financial engineering (varying dividend pay outs, borrowing and share repurchases) listed companies can seamlessly transform dividends into interest or capital gains. (FT, 17/10/07)

Dividend income taxes

- 'old view': dividend taxes reduce households' return to savings; cutting these taxes spurs investment
- 'new view': marginal investments funded by retained earnings; thus, dividend tax cuts irrelevant to corporate decisions (means what?)
- equity - efficiency tradeoff?
  - equity: dividends accrue to the wealthiest
  - efficiency: reduced dividends may worsen free cash flow   ▸ free cash flow

We document a 20 percent increase in dividend payments by nonfinancial, nonutility publicly traded corporations following the [US] tax cut. . . . the number of firms paying dividends began to increase in 2003 after a continuous decline for more than two decades. Firms with high levels of nontaxable institutional ownership did not change payout policies, . . . The response to the tax cut was strongest in firms with strong principals whose tax incentives changed . . . , and in firms where agents had stronger incentives to respond [Chetty and Saez, 2005]
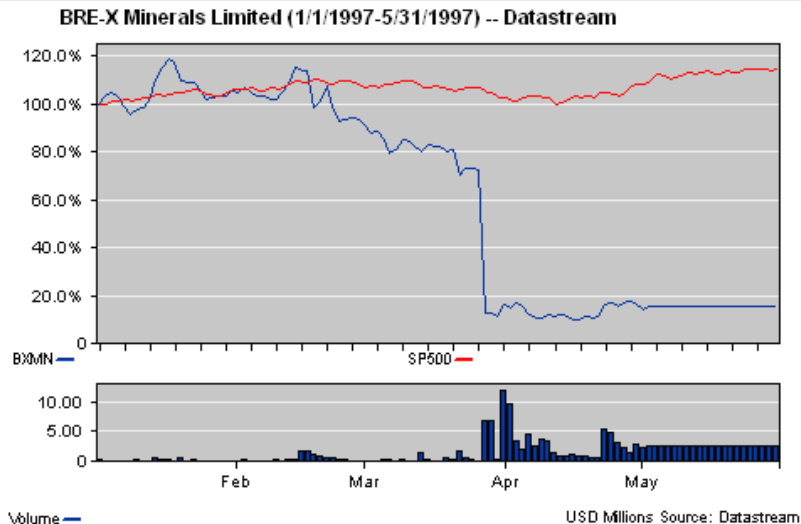
etc.

1. US start-ups relied heavily on debt (rather than insider) financing; their subsequent success reflects their ability to tap debt markets [Robb and Robinson, 2010]

2. The Paradox of Corporate Taxes (1 Feb 2011, NYT):

> *G.E. is so good at avoiding taxes that some people consider its tax department to be the best in the world, even better than any law firm's. . . . The problem with the current system is that it distorts incentives. Decisions that would otherwise be inefficient for a company - and that are indeed inefficient for the larger economy - can make sense when they bring a big tax break. . . . Instead, airlines sometimes buy more planes than they really need. Energy companies drill more holes. Drug companies conduct research with only marginal prospects of success.*

3. Tax drives US tech groups to tap debt (6 Feb 2011, FT)

4. Zuckerberg's Big Tax Bill May Benefit Facebook (3 Feb 2012, NYT)

Example (Bre-X)

BRE-X Minerals Limited (1/1/1997-5/31/1997) -- Datastream

- also, of course, Enron, WorldCom, and Madoff's Ponzi scheme
- but these are extreme cases of fraud ◂ EMH

Example (What do CEOs do?)

Bandiera, Guiso, Prat & Sadun:

- studied time use diaries recorded by 100 Italian CEOs' PAs
- revealed preference exercise: investigating time use sheds light on implicit objectives
- "CEOs who work longer hours spend proportionately more time working alone and with insiders . . . they spend less time (in absolute terms) with outsiders", and particularly in "one-to-one meetings" with "outsiders"
- in presence of moral hazard, "time spent alone with outsiders only benefits the CEO . . . firms with better governance hire CEOs who work longer hours and devote their time to productive activities [with insiders]"

Superstar CEOs

We evaluate the impact of CEOs achieving superstar status on the performance of their firms . . . We find that award-winning CEOs subsequently underperform, both relative to their prior performance and relative to a matched sample of non-winning CEOs. At the same time, they extract more compensation following the awards, . . . They also spend more time on public and private activities outside their companies, such as assuming board seats or writing books. The effects are strongest in firms with weak corporate governance. Our results suggest that the ex post consequences of media-induced superstar status for shareholders are [−15 to −26%] [Malmendier and Tate, 2009]

- if Malmendier and Tate [2009] studied Pakistani or Nigerian CEOs, rather than US ones, would we talk of 'corruption' instead of 'moral hazard'?

Overcoming agency problems

- moral hazard: when managers take the 'wrong' actions
  1. misallocate their effort to personally preferred activities
  2. take actions to entrench their positions
- adverse selection: having the wrong people for the job
- overcoming moral hazard
  1. incentive schemes to align managers', shareholders' interests
  2. monitoring schemes to overcome informational asymmetries
  3. contractual constraints on management (inc. covenants)
- what does this do to trust?

  the importance of trust and how one will lose it if one questions the other side . . . That's not to say that one should never do that. But one better have good reasons and also understand that it is a last option. . . . if the board can't trust the management team to say and do things honestly, I don't think they should continue with that management team. It's that simple. That's a further reason to be very careful before one goes into a deep questioning mode. (Bengt Holmström, MIT, Nokia; personal correspondence)

How important is moral hazard in managerial pay?

Example (Gayle and Miller [2009])

- (US) CEO compensation has increased dramatically in last quarter century
  - top 100 CEO pay averages between US$16mn - US$30 mn [Terviö, 2008]
- largest component is performance related pay (e.g. options)
- to what extent does this reflect moral hazard concerns?
  1. firms have changed over time
  2. managers may also have changed (e.g. risk attitudes)
- how measure moral hazard?
  1. firm value lost from failing to contract for MH
  2. managerial gain from pursuing private goals
  3. value of technology for monitoring managerial performance
- find that most pay growth comes from (exogenous) firm size growth
  - firm size has indirect MH effect: incentive problem worsens
- clearer sectoral benchmarking reduces MH problem

Assumptions: the project

- simple model to show how moral hazard can stop $NPV > 0$ projects [Tirole, 2005, ★,§3.2]
  - no debt/equity distinction, internal/external choice
- an entrepreneur has a project that costs I to finance
- she has assets (net worth) of $A < I$
- implementing the project requires external finance of $I - A$
- if the project succeeds, it yields verifiable income $R > 0$
- if it fails, it yields 0
- it succeeds with probability p_H if the entrepreneur exerts effort
- it succeeds with probability $p_L < p_H$ if the entrepreneur shirks
  - as notation, $\Delta p \equiv p_H - p_L$
- shirking earns the entrepreneur private benefits of $B > 0$
  - B is the source of agency costs

More assumptions: preferences and the loan agreement

- entrepreneur and potential investors are all risk neutral
- to simplify, assume no time preference, and 0 expected rate of return
- the loan contract specifies how R is shared in the event of success
  - in case of failure, there's nothing to share
  - an attempt to transfer resources from the investor in the event of failure would not work (why?)
  - in case of success, $R_l + R_b = R$
  - effort isn't verifiable
- there's a competitive investment market, so − if the loan contract induces effort − investors make zero profits

$$p_H R_l = I - A > p_L R_l$$

- rearranging, the rate of return, i (a risk premium if $p_H < 1$), is

$$R_l = \frac{1}{p_H} (I - A) = (1 + i) (I - A)$$

- project only viable without moral hazard: $p_H R - I > 0 > p_L R - I + B$ (why assume this?)

The lenders' credit analysis

- lender knows: project only worthwhile if entrepreneur exerts effort
- therefore, loan contract must leave entrepreneur preferring to exert
- incentive compatibility constraint ◄ maturity IC

$$p_H R_b \geq p_L R_b + B \Leftrightarrow \Delta p R_b \geq B$$

- maximum pledgeable income to investors to avoid moral hazard:

$$\frac{B}{\Delta p} \leq R_b = R - R_l \Rightarrow R_l \leq R - \frac{B}{\Delta p}$$

◄ overhang

- the (maximum IC) expected pledgeable income is

$$\mathcal{P} = p_H \left(R - \frac{B}{\Delta p} \right)$$

- investors' individual rationality / participation constraint is

$$p_H \left(R - \frac{B}{\Delta p} \right) \geq I - A$$

Conditions for financing and credit rationing

- re-arrange the IR constraint for a condition on entrepreneur's assets

$$A \geq \bar{A} \equiv p_H \frac{B}{\Delta p} - (p_H R - I)$$

  ◂ overhang

- what does this mean?
  - credit rationing when $A \in (0, \bar{A})$ although $NPV > 0$
  - there isn't an R_l sufficiently low to motivate the entrepreneur . . .
  - . . . while being high enough to repay the investor
  - entrepreneur may offer a higher interest rate ($\equiv$ higher R_l), but investor won't accept
- shall assume $\bar{A} > 0 \Leftrightarrow p_H R - I < p_H \frac{B}{\Delta p}$
- if $A > \bar{A}$, competitive market assumption pins down R_l
  - what assuming on how surplus is shared between entrepreneur and lender, and why?

Determinants of credit rationing

$$A \geq \bar{A} \equiv p_H \frac{B}{\Delta p} - (p_H R - I)$$

1. obviously, low assets, A: the entrepreneur can't pledge enough cash or other assets to ensure potential investors that she will be committed to exerting effort
2. high agency costs, $p_H \frac{B}{\Delta p}$
   1. private benefits, B, measure the return to shirking
   2. the likelihood ratio,
      $$\frac{\Delta p}{p_H} = \frac{p_H - p_L}{p_H}$$
      is the (expected) return to effort (à la marginal product of effort)
   3. agency costs are the ratio of the returns to shirking to those to effort
3. higher expected NPV of project (given effort), $p_H R - I$ helps
4. (in more general models, depends also on legal environment: q.v. Armour et al. [2008] for an introduction to a large literature)

MM: debt maturity structure makes no difference

Example (Almeida et al. [2009])

Firms whose long-term debt was largely maturing right after the third quarter of 2007 reduced investment by 2.5% more (on a quarterly basis) than otherwise similar firms whose debt was scheduled to mature well after 2008. This relative decline in investment is statistically significant and economically large, representing approximately one-third of pre-crisis investment levels. ▸ US GDP changes

- econometric 'advantage' of August 2007 crisis: largely unanticipated, and rooted in housing mortgages rather than firm balance sheets
- "Long-term debt is typically publicly held, and difficult to renegotiate on short notice during crises."

- Figure 2 of Fan et al. [forthcoming] compares debt maturity ratios internationally

Introduction to liquidity management

*highly indebted firms are more likely to borrow on a short-term
and secured basis going forward [Tirole, 2005, ★, §2.5]*

- solvent: $NPV > 0$
- liquid: income > payments at all periods
  - short term debt: tight leash
  - long term debt: more breathing room
- given a possible liquidity shock, what maturity structure is optimal?
- Scylla and Charybdis
  - want enough liquidity to survive shock
  - but not too much to succumb to free cash flow problem
- ★ Tirole [2005, §5.2] extends basic moral hazard model ▸ basic model

A simple model of liquidity and maturity

1. as simple model: entrepreneur has assets A and investment costing I
2. interim period
   - certain, verifiable income $r \geq 0$
   - liquidity shock requires new injection of funds ρ to save project
   - $\rho \in [0, \infty)$ with distribution $F(\rho)$, density $f(\rho)$
   - simple model was a special case with $r = \rho = 0$
3. entrepreneur chooses effort level, hence p_H or p_L
4. project earns final income R if succeeds

- contract specifies
  1. R_b, final payment to entrepreneur (as in simple model)
  2. r_b, interim payment to entrepreneur
  3. ρ^*, threshold rule: continue project iff $\rho \leq \rho^*$
- how does the moral hazard problem affect the threshold, ρ^*?

Net present value

- recall simple MH: NPV was $p_H R - I$
- if effort is undertaken, the project's NPV is

$$[r + F(\rho^*) p_H R] - \left[I + \int_0^{\rho^*} \rho f(\rho) \, d\rho \right]$$

- thus, by the first fundamental theorem of calculus,

$$\frac{\partial \text{NPV}}{\partial \rho^*} = f(\rho^*) p_H R - \rho^* f(\rho^*) = f(\rho^*) [p_H R - \rho^*]$$

- first best threshold $\rho^* = p_H R$ maximises NPV
- fixed cost intuition
  - at interim stage, treat I as a sunk cost
  - project NPV decreases when new costs exceed expected return

Expected pledgeable income

- recall simple MH: $\mathcal{P} = p_H \left(R - \dfrac{B}{\Delta p} \right)$
- the IC constraint after the liquidity shock is again ▸ simple IC
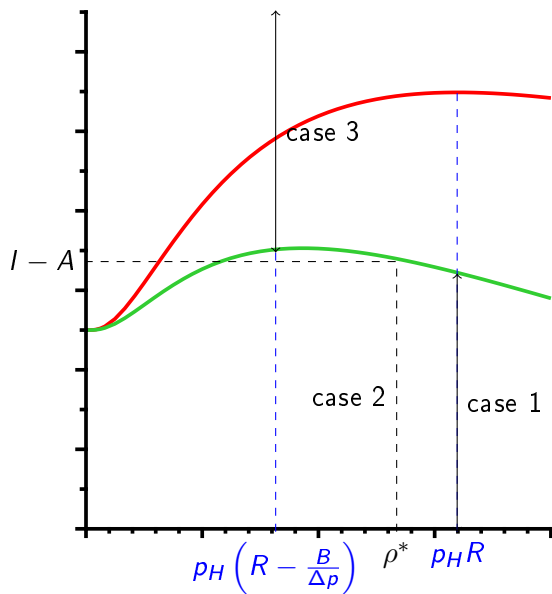
$$\Delta p R_b \geq B$$

- ex ante, expected pledgeable income is

$$\mathcal{P}(\rho^*) = \underbrace{r + F(\rho^*) \, p_H \left(R - \frac{B}{\Delta p} \right)}_{\text{expected income given IC}} - \underbrace{\int_0^{\rho^*} \rho f(\rho) \, d\rho}_{\text{continuation cost}}$$

- again, differentiation yields

$$\frac{\partial \mathcal{P}}{\partial \rho^*} = f(\rho^*) \, p_H \left(R - \frac{B}{\Delta p} \right) - \rho^* f(\rho^*) = f(\rho^*) \left[p_H \left(R - \frac{B}{\Delta p} \right) - \rho^* \right]$$

- intuition: maximum at lower ρ^* than that for NPV as investors can only claim income net of agency costs

Case 1: efficient liquidation when $I - A \leq \mathcal{P}(p_H R)$

- first best threshold rule ($\rho^* = ?$) still leaves enough pledgeable income for investors to recover their costs
- thus, it can be implemented
- optimal contract
    - $r_b \geq 0$ and $R_b \geq \frac{B}{\delta p}$, the latter to satisfy IC constraint (hence investor's IR constraint)
    - if 2nd constraint not binding, indeterminate but with equivalent expected returns: why?

Case 2: over-optimal liquidation when
$$I - A \in \left(\mathcal{P}\left(p_H R\right), \mathcal{P}\left(p_H \left(R - \frac{B}{\Delta p}\right)\right)\right]$$

- first inequality: first best threshold doesn't leave investors enough pledgeable income to recover their costs
- second inequality
  - $\mathcal{P}\left(\rho^*\right)$ declines beyond $p_H \left(R - \frac{B}{\Delta p}\right)$
  - if set $\rho^* = p_H \left(R - \frac{B}{\Delta p}\right)$, investors can recover their costs
- optimal contract
  1. $r_b = 0$ (otherwise reduces R_b, which worsens MH problem)
  2. $R_b = \frac{B}{\Delta p}$ (surplus is just enough to pay agency rent)
  3. $\rho^* \in \left[p_H \left(R - \frac{B}{\Delta p}\right), p_H R\right]$ implicitly defined by
  $$r + F\left(\rho^*\right) p_H \left(R - \frac{B}{\Delta p}\right) = (I - A) + \int_0^{\rho^*} \rho f\left(\rho\right) d\rho$$
- intuition: credit rationing now also forces borrower accept ex post suboptimal reinvestment level at interim period

Case 3: project infeasible when $I - A > \mathcal{P}\left(p_H\left(R - \frac{B}{\Delta p}\right)\right)$

- even when pledgeable income is maximised, investors won't be able to recover their costs

Term structure of cash-rich firms

- cash-rich firm $\equiv$ should generate net cash at interim period, $r \geq \rho^*$
- can implement optimal choice of ρ^* with following maturity structure
  - short-term debt (repaid after interim period)

  $$d \equiv r - \rho^*$$

  $\therefore$ contract retains enough to meet worst shock itself, pays out rest
    1. $d \leq \dots$ avoids bankruptcy risk (why, if risk neutral?)
    2. $d \geq \dots$ reduces D, allowing higher R_b, easing MH
  - long-term debt or equity (repaid at end)

  $$D \leq R - \frac{B}{\Delta p}$$

  (why? q.v. Tirole [2005, ★,p.204] erratum, inc. footnote)
- from Figure: effect of a strong balance sheet (higher A) on ρ^*
  - case 1: ρ^* weakly increases (why?)
  - case 2: ρ^* increases (why?)

  so that stronger balance sheet reduces short term debt

MM: debt maturity structure makes no difference

Example (Hordes of hoarders)

Since the credit crunch started in 2007, US non-financial companies have increased the share of their assets held in cash by 50 per cent. This is a cushion against another credit crunch. But it has left them – particularly Apple, whose revenues are growing far faster than it can reinvest them – with huge cash balances, which could have a big impact on markets and the economy. (FT, 30/01/12)

Cash-poor firms: 'wait and see' approach

- in contrast to cash-rich firm, suppose extreme case that $r = 0$
  - can't meet liquidity shock out of excess interim earnings
- suppose that firm borrows $I - A$ initially, waits to see what happens
  - let $\rho_0 \equiv p_H \left(R - \frac{B}{\Delta p} \right)$ be total share value, of which $\rho_L \equiv I - A$
    - thus, internal shares worth $\rho_B \equiv \rho_0 - \rho_L$
- when ρ is realised, tries to issue new securities to cover it
  1. $\rho < \rho_0$: new investors need to be repaid ρ, diluting initial investors to $\rho_0 - \rho > 0$
     - doesn't matter whether new securities are senior to initial or not
     - do the initial investors not consider the possibility of dilution in their original zero profit calculation?
  2. $\rho \in (\rho_0, \rho^*]$: no new investors buy in, 'wait and see' fails, adding inefficiency
- ability to dilute existing investors for $\rho < \rho_0$ implies can renegotiate
  - contrast with debt overhang ▸ debt overhang

Cash-poor firms: forward looking approach

(again, $r = 0$)

- how handle shocks $\rho \in (\rho_0, \rho^*]$?

1. hoard liquid reserves by overborrowing $I - A + \rho^*$ initially
   - as ρ^* financed, write negative covenant preventing dilution
   - would a lender to agree to this? What is extra ρ^* often called?
2. obtain irrevocable credit line initially for up to ρ^*
   - as ρ^* financed, write negative covenant preventing dilution
   - $\rho \leq \rho^* \leq p_H R$ is ex post efficient from NPV POV to continue
     - thus, can't renegotiate away from it
   - credit line provider expects to lose as $\rho > \rho_0$, max pledgeable income
     - thus, credit facility must be irrevocable
   - such letters very rare: why would zero profit lender provide one?
   - is lenders' reputation enough to enforce them?
3. combination: overborrow and/or credit line for $\rho^* - \rho_0$, and right to dilute to continue up to ρ_0

Free cash flow

Free cash flow is the cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital. ★ *Jensen [1986]*

Berk and DeMarzo (2007, Ch.26) report that corporate liquidity rose in U.S firms from $3.6 trillion in 1999 to $5 trillion in 2005. Bates, Kahle and Stulz (2008) document that the aggregate cash ratio, that is the ratio of cash and marketable securities to the book value of total assets, increased from 6.3% in 1980 to 10.3% in 2006, while the average cash ratio increased from 10.5% to 23.2% over the same period. [Décamps et al., 2008]

- seems consistent with majority internal financing ▸ net finance sources
- less expensive, easier than convincing less informed market

◂ dividend income

Example

Sky's free cash flow, the core of its appeal, to News Corp, is soaring after a wave of investment subsided. (FT, 28 Jan, 2011)

Example

Apple now has more cash to spend than the United States government.
Latest figures from the US Treasury Department show that the country has an operating cash balance of $73.7bn (£45.3bn).
Apple's most recent financial results put its reserves at $76.4bn. (BBC, 29/07/11)

Free cash flow hypothesis

> *The free cash flow theory says that dangerously high debt levels will increase value, despite the threat of financial distress, when a firm's operating cash flow significantly exceeds its profitable investment opportunities. The free cash flow theory is designed for mature firms that are prone to overinvest.* [Myers, 2001, ★]

- what can firms do with their intermediate income?
  1. invest in projects
  2. retain it
  3. pay out as increased dividends to shareholders
  4. pay out to shareholders by repurchasing stock
- if managers retain the funds, will they use them for other reasons than funding positive NPV projects?
- debt more effective commitment than dividends
  - can always decrease future dividend payments;
  - defaulting on debt payments ⇒ bankruptcy

Example (The US oil industry)

For example, 1984 cash flows of the ten largest oil companies were $48.5 billion, 28 percent of the total cash flows of the top 200 firms in Dun's Business Month survey. Consistent with the agency costs of free cash flow, management did not pay out the excess resources to shareholders. Instead, the industry continued to spend heavily on [exploration and development] activity even though average returns were below the cost of capital. [Jensen, 1986, ★]

- negative correlation between exploration announcements and firms' market values (opposite effect to research announcements in other industries)
- managers also diversified by acquiring firms in other industries
  - these mergers often failed to add value
  - better than investing in negative NPV projects? They transfer resources from managers to shareholders of target firms.

Consequences of free-cash flow in the US oil industry

- these unprofitable activities reduced oil firms' market values
- under-valued firms contributed to a merger wave [Commission, 1982]
  - resources left the industry as shareholders are bought out and depart
  - free cash paid out to target shareholders
  - this reduced the agency cost of free cash flow
  - efficiency returned in the oil industry

Other evidence for the free cash flow hypothesis

Most leverage-increasing transactions . . . result in significantly positive increases in common stock prices. . . . Most leverage-reducing transactions . . . result in significant decreases in stock prices. [Jensen, 1986, ★]

- leveraged buyouts (LBOs) particularly attractive in large, mature firms with large free cash flow [Jensen, 1986, ★]

$1.00 of cash in a poorly governed firm is valued at only $0.42 to $0.88. Good governance approximately doubles this value. . . . firms with poor corporate governance dissipate cash quickly in ways that significantly reduce operating performance. This negative impact of large cash holdings . . . is cancelled out if the firm is well governed. [Dittmar and Mahrt-Smith, 2007]

Passing a corporate governance provision generates a 1.3% abnormal return on the day of the vote with an implied market value per provision of 2.8%. [Cuñat et al., 2010]

Example

Steve Jobs's declaration last week that the technology company wants to hold on to its $51bn in cash and securities because it sees "strategic opportunities" ahead, has provoked speculation about what it might acquire. . . .

Among the most fanciful ideas being batted around by outsiders are takeovers of Facebook, . . . valued in private share sales at more than $30bn, and perhaps Disney, the media group worth $67bn . . .

But either would break Apple's long-running pattern of investments – it has never paid more than $500m for a target – which risks straying into unfamiliar arenas. Former executives and bankers said they would be shocked if [Apple] did anything as far-reaching.

"I don't think they will buy anything big any time soon. It is just not in their genes," said a former Apple strategist. . . .

Apple has historically bought smaller companies with intellectual property and strong talent in areas of growing importance for the company. (FT, 24/10/11)

Debt overhang

part of the value of a firm is accounted for by the present value of options to make further investments on possibly favorable terms. . . . a firm with risky debt outstanding, and which acts in its stockholders' interest, will follow a different decision rule than one which can issue risk-free debt or which issues no debt at all. The firm financed with risky debt will, in some states of nature, pass up valuable investment opportunities . . . The loss of market value is absorbed by the firm's current stockholders. Thus, in the absence of taxes, the optimal strategy is to issue no risky debt. ★ *[Myers, 1977]*

a new investment cannot be financed solely because renegotiation with previous debtholders proves infeasible. [Tirole, 2005, ★,p.125]

firms with good growth prospects might be expected to take less debt for fear of compromising future investment. ★ *Tirole [2005]*

Example (Who killed James Bond? FT magazine, 24-25/07/10)

- MGM studios: "on the edge of insolvency and flirting with bankruptcy. It has a $3.7bn debt pile and is unable to make its regular interest payments"

- "the [Bond] series is in limbo, postponed indefinitely ... because of the uncertainty surrounding the studio"

- "the cash it was generating convinced the consortium of companies buying the studio for $5bn to load it up with debt which, ultimately, it could not afford to repay"

- "the lenders made a big mistake when they let it be known MGM was in trouble and for sale"

- "Potential partners that could have salvaged some of its films in development ... have given MGM a wide berth because they fear the studio could go bankrupt"

- "A restructuring might have been easier were it not for the intervention of two hedge funds ... the lenders are now preparing to sit out the current economic slump and see if the company can be sold at a later date for a higher price."

Example (Renegotiating securitised mortgages)

Too many families are being thrown out of their homes when it makes more sense to let them stay by "reworking" their mortgages . . . In many cases, adjusting loans would help the homeowners and the lenders: the new mortgages would have lower monthly payments that homeowners could afford to pay, and would end up giving the lenders more money than the 50 cents on the dollar that many foreclosure sales are bringing . . .

In the old days, a mortgage loan involved only two parties, a borrower and a bank. . . . The world of securitization changed that . . . There is no longer any equivalent of "the bank" that has an incentive to rework failing loans. . . . A party called a "master servicer" manages the pools of loans.

Why are the master servicers not doing what an old-fashioned banker would do? . . . Most anything a master servicer does to rework a loan will create big winners but also some big losers among the security holders to whom the servicer holds equal duties. . . . By allowing foreclosures to proceed without much intervention, they avoid potentially huge lawsuits by injured security holders. (Geanakoplos: Yale, Ellington Capital; Koniak: Boston U; New York Times, 29/10/08)

Their 2009 follow-up piece works through the argument in more detail.

Yet all this official financing has done little to improve Greece's long-term prospects and, rather than attracting new private financing, it has enabled some private creditors to redeem at maturity their investments with no principal losses. (Mohamed el-Erian, FT, 10/02/12)

An indebted firm with a new project

- now the firm has debts, D, from previous activities, but no further assets or ongoing projects
- it has a new investment idea, costing I, with NPV so large that it could attract funds even if the entrepreneur had no net worth, $\bar{A} < 0$
- if the project is funded, and succeeds, earning R, the senior debt is repaid first
- if not funded, or if it fails, no creditors are repaid
- the debt overhang is large:

$$D > -\frac{\bar{A}}{p_H}$$

- shall see: same as simple MH model, but with $D = -A$

Initial investors are not credit constrained

1. initial investors may not finance the new project; if fails, receive 0
2. unconstrained initial investors may finance the new project
   - forgive D, which couldn't be repaid otherwise
   - pay new I
   - if succeeds, receive up to $p_H \left(R - \frac{B}{\Delta p} \right) - I$
   - by definition, this is $-\bar{A} > 0$, so better than not funding ⟨▸ $\bar{A}$⟩
   - (entrepreneur expects at least $p_H \frac{B}{\Delta p} > 0$, so satisfies IC)

- without renegotiation problem, firm can act to maximise NPV

Initial investors are credit constrained

- if the initial investors have insufficient funds, the entrepreneur needs to attact new investors
- now maximum pledgeable income is $R - \frac{B}{\Delta p} - D$ (why?) ▸ max R_l
- thus, new investors only accept if

$$p_H \left(R - \frac{B}{\Delta p} - D \right) \geq I$$

  which can be rearranged for $-p_H D \geq \bar{A}$, a problem (why?)
- in spite of having a profitable project, the entrepreneur can't finance it unless she renegotiates her existing debt levels
  - particularly problematic when the existing investors are dispersed
  - with renegotiation problem, firm cannot act to maximise NPV

In our view, the assumption of identical expectations is unrealistic, some of its implications are untenable, and it leaves unexplained some important phenomena of the capital market. [Stiglitz, 1972]

- MM proof based on no-arbitrage argument: holding equity earns share of firm's NPV
- but . . .

The efficient market hypothesis postulates that markets tend towards equilibrium and deviations occur in a random fashion; moreover, markets are supposed to function without any discontinuity in the sequence of prices. . . . But the efficient market hypothesis is unrealistic. . . . If too many participants are on the same side, positions cannot be liquidated without causing a discontinuity or, worse, a collapse. (George Soros; FT, 16/06/09)

▸ Bre-X

- if homogeneous expectations, everyone prices everything the same way
- argument for derivatives then that allows more risk-sharing
- but . . .

derivatives . . . are complex assets that are difficult to price. Since their values depend on complex interaction of numerous attributes, the issuer can easily tamper derivatives without anybody being able to detect it within a reasonable amount of time. Studies suggest that valuations for a given product by different sophisticated investment banks can be easily 17% apart and that even a single bank's evaluations of different tranches of the same derivative may be mutually inconsistent. [Arora et al., 2011]

Example (Shiller [2003]: micro-efficient, but macro-inefficient?)

- 1970s: heyday of EMH
- 1980s: excess volatility of stock prices relative to EMH predictions (e.g. animal spirits)
  - variance of current prices (forecasting dividends) must be less than that of forecasted variable (e.g. dividends)
  - but S&P 500 dividends fairly stable, while S&P itself is not
- micro-efficient, but macro-inefficient?

  > dividend-price ratios on individual stocks do serve as
  > forecasts of long-term future changes in their future
  > dividends, as efficient markets assert.

Example (Malkiel [2003]: efficient enough in practice)

- EMH $\approx$ random walk of stock prices
  - if prices quickly reflect news, and . . .
  - if news is unpredictable, then . . .
  - stock prices should be as well
  - thus, to invest well, buy a low cost portfolio
- efficient markets: high returns require high risk
- not perfectly efficient, but skeptical of anomalies
  - as info costly to acquire, abnormal returns are compensation for research costs [Grossman and Stiglitz, 1980]
  - serial price correlation too small to overcome transaction costs
  - patterns fade after being published (data-mining or arbitraged?)
- apparent predictability of ratios like PE may indicate simplistic model (e.g. CAPM), hence omitted variable [Fama and French, 1993]
- bubbles and crashes: test is whether there were arbitrage opportunities, not hindsight
- n.b. does not directly address excess volatility question

etc.

- EMH not directly refutable as it is joint hypothesis with an expectations formation model
- hence, behavioural finance [Shleifer, 2000, q.v.,]
  1. violations of rationality
  2. agency arguments
- see http://www.e-m-h.org for a good online resource

Example (The leverage cycle)

Geanakoplos [2010]: belief heterogeneity leads pessimists to value collateral less than optimists do

What does issuing new shares mean?

Example

Shares of LG Electronics plunged ... 14% to 62,000 won after reports indicated that it planned to raise as much as 1tn won ($885m; £557m).

There was speculation that the company was raising cash to support its struggling smartphone and LCD units. (BBC, 03/11/11)

Example

Dexia, the stricken Franco-Belgian lender that has been at the centre of recent market turmoil, loaned €1.5bn of fresh capital to its two largest institutional shareholders which then used the cash to buy Dexia shares before 2008 ... The unorthodox funding move ... amounted to Dexia borrowing money from itself to finance a capital increase. (FT, 20/10/11)

Introducing the pecking order hypothesis

The pecking order theory says that the firm will borrow, rather than issuing equity, when internal cash flow is not sufficient to fund capital expenditures. Thus the amount of debt will reflect the firm's cumulative need for external funds. [Myers, 2001, ★]

- if managers act in the interests of existing shareholders, does a decision to issue new equity signal that existing equity is over or underpriced?
  - n.b. not acting in own private interests, per se
- pecking order hypothesis (Myers [1984], ★ Myers and Majluf [1984]) springs from this, not transaction costs
- older explanations: aversion to debt irrationally reflected bad experiences in Great Depression; does help explain [Malmendier, 2010]

Example (Negative price impact of new equity issue [Asquith and Mullins, 1986])

- known firms' stock offerings cut about $\frac{1}{3}$ of the value raised from existing shares
- the loss is bigger for less known firms (inc. fewer analysts)
- on average, firms lose 3% of pre-issue market cap due to issue
- informational asymmetry (e.g. more dispersed analysts' forecasts) increases mark-down (★ Myers [2001])

Example (Market timing)

firms issue relatively more equity than debt just before periods of low market returns . . . the equity share in new issues is a stronger predictor of one-year-ahead returns than the dividend-to-price ratio or the book-to-market ratio. [Baker and Wurgler, 2000]

capital structure is the cumulative outcome of past attempts to time the equity market. Baker and Wurgler [2002]

The pecking order hypothesis

- ★ Myers and Majluf [1984, §1, 2] assumed
  1. managers act in interests of existing shareholders
  2. existing shareholders passive; don't adjust portfolios in response to new issues
- share issue therefore reflects either
  1. over-valued shares (so new investors subsidise existing ones)
  2. under-valued shares (so new investors gain by diluting existing ones), but new growth opportunity is sufficiently appealing to existing shareholders
- on average, firms issuing therefore of lower value
- may pass up valuable investment opportunities
- why can't firms just reveal their private information to the market?

Informational intensity of assets

- as debt is senior to equity, and 'fixed income', less subject to informational asymmetry
  - expect value of firm to drop less in response to debt issue
  - empirical support cited by Myers [2001, ★,p.92]
  - thus, managers should prefer to issue debt if not too expensive (why would it be?)
- valuation of equity issues more subject to informational asymmetries
  - due to this disadvantage, only issue when debt expensive

  1. use internal finance first
  2. then debt (the safest security)
  3. then hybrid securities such as convertibles (holder can convert into equity)
  4. finally, equity

- in addition to sequence of financing (internal, debt, equity, . . .)
  1. changes in net cash flow change external financing (variable margin) via retentions or debt repayment, not dividends
  2. more profitable firms borrow less not because have lower target debt ratio but because have more retained earnings

Example (★ §2.2 Myers and Majluf [1984])

- firm has liquid assets of commonly known value (0 in this example)
- investment opportunity costs $I = 100$ to finance
- no transaction costs, taxes, discounting
- firm has assets in place and investment opportunity whose value is better known to its managers
  1. managers know a, r, future values of each, respectively
  2. market initially only knows $\tilde{A}, \tilde{R}$, with expectations $\bar{A}, \bar{R}$; learns a, r later
- managers known to act in old shareholders' interests, who are known to be passive
- prospective investors regard two states as equiprobable

	state 1	state 2
assets in place	$a = 150$	$a = 50$
investment opportunity (NPV)	$r = 20$	$r = 10$

Example (★ §2.2 Myers and Majluf [1984]: invest iff $NPV \geq 0$?)

	state 1	state 2
assets in place	$a = 150$	$a = 50$
investment opportunity (NPV)	$r = 20$	$r = 10$

- suppose that managers issue equity iff $r \geq 0$ (and are known to do so)
- market value of old shares before state revealed is

$$p' \equiv \bar{A} + \bar{R} = \frac{1}{2}\left(150 + 50\right) + \frac{1}{2}\left(20 + 10\right) = 115$$

- if later revealed to be in state 1, total market value is

$$V^1 \equiv a + r + I = 150 + 20 + 100 = 270$$

  so value of old shares is now $V^1_{\text{old}} \equiv \frac{p'}{p'+I} V^1 = \frac{115}{215} \cdot 270 \approx 144.42$
  while that of new shares is $V^1_{\text{new}} \equiv \frac{I}{p'+I} V^1 = \frac{100}{215} \cdot 270 \approx 125.58$
- similarly, $V^2 = V^2_{\text{old}} + V^2_{\text{new}} = 160 \approx 85.58 + 74.42$
- if state 1 expected, shares are underpriced; if state 2, overpriced

Example (★ §2.2 Myers and Majluf [1984]: is 'invest iff $NPV \geq 0$' EQ?)

	issue and invest	do nothing
V_{old}^1	144.42	150
V_{old}^2	85.58	50

- $\therefore$ mgt acting in old shareholders' interests only issue in state 2
  - shares were overpriced; new dilute losses that old would otherwise bear alone
- if mgt known to so behave, issue signals state 2, so that
  $p' = 160 - 100$ (to repay new equity) so that payoffs really are . . .

	issue and invest	do nothing
V_{old}^1	—	150
V_{old}^2	60	—

- before management acts, average payoff to old investors is $105 < 115$ as passes on the 20 NPV investment 50% of the time
- shadow value of cash: firm with liquid assets of 100 is worth 110 more

The pecking order hypothesis and the cycle

- one explanation for issuing more shares during booms is that lemons problem becomes relatively less important
  - q.v. ★ Tirole [2005, §6.2]
- Dang et al. [2009]: debt becomes info sensitive in financial crisis; increased info sensitivity when balance sheets shrink

Example

Britain's big banks are issuing an aggregate £2.7bn of new equity to fund staff bonuses and other pay-outs after pressure from regulators to keep capital levels high.

Traditionally banks have funded a large proportion of employees' share-based bonus pay-outs by buying back stock in the market and redistributing it to staff.

But at the urging of the Bank of England's Financial Policy Committee, which aims to ensure stability across the banking system, the banks are issuing new stock, diluting current shareholders slightly.

That strategy means that close to half of total bonus pay-outs are being funded out of new equity, helping to preserve capital buffers. (FT, 04/03/12)

Why do firms exist?

Ownership is a source of power when contracts are incomplete.
[Hart, 1995, p. 29]

- if markets are good, . . .
- and (central) planning bad, . . .
- why have firms that plan?
  - why contract to create a firm?
  - why contract to buy from firms?
- concentrate on incomplete contract theories [Tirole, 1999]
  - unforeseen events
  - cost of writing contracts
- a project's NPV may be influenced by firm's ownership (v. Fisher separation)
- 3rd generation corporate finance literature incorporates this
- Hart [1995, Ch. 1, 2] is the main reference, drawing on ★ Grossman and Hart [1986], Hart and Moore [1990]

Who should control a firm's decisions?

- with incomplete agreement and contracts, who makes the decisions becomes important
- ownership gives the power to decide what to do when contracts are incomplete
- equity gives not just residual income, but residual control (e.g. how are the profits from a cost-reducing innovation split?)
- owning a house is different from renting one; investing with a mutual fund may be different from owning the shares in that fund.
- explore by extending moral hazard model [Tirole, 2005, ★, Ch. 10.2]

1. sign initial contract, R_b, to raise $I - A$
2. iff succeeds (with probability p_H or p_L), generates R
3. unforeseen opportunity (e.g. ...?) raises probability of success by τ in both cases
   - incurs private managerial cost of $\gamma > 0$
   - 'orthogonality' assumption means that taking action leaves IC constraint unaltered
   - thus, doesn't matter if occurs before or after contract

Cases

1. $\tau R < \gamma$: profit enhancing action reduces aggregate welfare
   1. entrepreneur owns the control rights, avoids new action
      - pledgeable income as initially: $p_H \left(R - \frac{B}{\Delta p} \right)$
      - NPV as initially: $p_H R - I$
   2. investors own the control rights, mandates new action
      - pledgeable income: $(p_H + \tau) \left(R - \frac{B}{\Delta p} \right)$
      - NPV: $(p_H + \tau) R - I - \gamma$

   - tension: transfer of control rights increases pledgeable income while reducing NPV
   - if $p_H \left(R - \frac{B}{\Delta p} \right) < I - A < (p_H + \tau) \left(R - \frac{B}{\Delta p} \right)$ entrepreneur could only raise funds initially by giving up control rights

2. $\tau R > \gamma$: profit enhancing action increases aggregate welfare
   - investor control increases pledgeable income and NPV
   - entrepreneur can be paid for loss of control rights

Relationship specific investment and the hold-up problem

- commercial relationships often involve investments whose value is less outside the relationship
  - a supplier makes other specialised tools to produce inputs for a manufacturer
  - a manufacturer designs a product around proprietary technology owned by a supplier
  - an employee learns about a firm's inner structure so as to be able to function more efficiently in it
- after an unforeseen state of nature it may be efficient to renegotiate the contract
- this threatens the returns to relationship specific investments
- this is the hold up problem, leading to underinvestment
- Hart and Moore [1990]: a buyer and a seller can each either buy a generic good from 'the market', or can invest in their relationship

Discussion

- Spulber [2001] has two articles arguing against the vertical integration interpretation of the Fisher Body - General Motors merger. These are underpinned, in part, by a 'Chicago School' belief that market inefficiency (such as the hold-up problem) is unusual.
- Kaplan and Strömberg [2003] examine venture capital contracts, finding evidence for incomplete contracts and concerns about hold-up
- Holmström and Roberts [1998] review theories of the firm, arguing that:

  . . . hold-up problems are of central concern to business people. In negotiating joint venture agreements, venture capital contracts, or any of a number of other business deals, much time is spent on building in protections against hold-ups. At the same time, such contracts are prima facie evidence that hold-up problems do not get resolved solely by integration of buyer and seller into a single party - the firm.

Some stylised facts [Tirole, 2005, §1.5]

1. 1980s US
   1. M&A wave historically high: 143 of Fortune 500 acquired by 1989
   2. in 1986, only 40 of 3336 transactions hostile, other 110 maybe (typical)

      - hostile takeovers indicate confidence, leading indicator for M&A's? (FT, 30/01/12)
   3. public firms often taken private by leveraged buyouts (LBOs), concentrating ownership
   4. corporate leverage climbed via junk bonds
   5. trend stops with junk bond defaults, S&L crisis (hmmm . . .)
   6. target shareholders win, acquirers neutral, with net positive due to efficiency gains
      - how measure net gains? e.g. how measure effect of threat of possible takeover . . .
2. 1990s US
   1. 1998 - 2001 merger wave even bigger
   2. paid with via equity, not debt
   3. better takeover defences, improved governance reduce hostile takeovers
   4. net loss of wealth - maybe US$134bn [Tirole, 2005, p.50]

Are takeovers efficient?

> *the measured combined value [of target and raider] has increased in some studies and decreased in others. It has been statistically significant in none. . . . Target firm prices consistently display large increases, but only if the initial bid or a later bid is successful. There is no permanent increase in value for target firms that do not eventually enter a corporate combination. Roll [1986, p. 213]*

- Andrade et al. [2001] find selling shareholders earned an average gain of 16%; acquiring companies just break even
- Jovanovic and Braguinsky [2004]: observed discounts consistent with rational agents and (constrained) efficient takeovers
  - firm's project quality is expensive to reveal
  - equilibrium has good managers with bad projects taking over bad managers with good projects
  - takeover bid thus signals both high quality target project (target premium), low quality acquirer project (bidder discount)

Anatomy of a takeover [Tirole, 2005, §1.5]

1. acquire a toehold, possibly clandestinely (q.v. toehold auctions)
2. announce a tender offer, including price(s)
   - can be for all or part; can condition on threshold; maybe legal to price discriminate
3. if hostile, incumbent management may deploy defenses
   1. successfully lobbied for antitakeover laws
   2. corporate charter defenses: staggered board, supermajority rules, etc.
   3. dilute raiders' equity
   4. poison pills: e.g. existing shareholders have option to buy more at low price if raider ...
   5. tactics: white knight, greenmail ...

1. does the ability to takeover a firm (and replace its incumbent management)
   1. keep management 'on their toes'; or
   2. give management myopic incentives?
2. if defences help bad management, why are they approved?
   1. weak governance; or
   2. maximise original shareholders' value?

The standard story

- ★ Grossman and Hart [1980], with Tirole [2005, §11.5] notation
  - firm's market value: v under existing management, $\hat{v}$ under raider
  - assume $\hat{v} - v = 1$, so takeover creates value
  - raider makes unrestricted, unconditional offer to acquire fraction κ of shares (see Tirole [2005, §11.5] for more details)
  - raider offers price $v + P$ for firm, with premium $P \geq 0$
  - c is the raider's cost of mounting a takeover bid
- a takeover bid profits the raider if

$$\hat{v} > v + P + c \Leftrightarrow P + c < 1$$

  As shareholders only sell if $P > 0$, a necessary condition for a profitable takeover opportunity is that

$$v < \hat{v} - c \Leftrightarrow c < 1$$

- takeover risk if management acts so that the firm's value falls too far
- as c decreases, so does management's margin for error
- good news! Takeover threat disciplines management towards efficiency

Exit and voice at Olympus

*"Despite one of the biggest scandals in history, [Olympus']
Japanese institutional shareholders have not spoken one single
word of criticism, in complete and utter contrast with the
overseas shareholders who were demanding accountability,"
Woodford told a news conference in Tokyo . . .*

*Japan's big banks such as SMFG and Mitsubishi UFJ Financial
Group are often cornerstone investors in Japanese blue chips, with
major equity and debt holdings. . . .*

*[Woodford] took aim at Japan's system of cross-shareholdings, in
which investors hold shares to cement business ties, as the key
reason for poor corporate governance and under-performance . . .*

*"Cross-shareholding served this nation well post the Second World
War. It made this nation into an economic super-power. The
situation is not that any more. This nation is going backwards,"
Woodford told the news conference.*

*"Cross-shareholding keeps everything comfortable, cozy, nice - no
confrontation, no challenge, no takeover."* (Reuters; 06/01/12)

Free-riding with forward-looking shareholders

- model as before, but now:
  - shareholders are small, so don't see their actions as pivotal
  - shareholders and the raider have rational expectations
- a shareholder who believes that the takeover will succeed with probability β will only sell if

$$v + P \geq \beta \hat{v} + (1 - \beta) v \Rightarrow P \geq \beta$$

- as $P > \beta$ leads all to sell, the only rational $\beta = 1$ ...
- ... but a premium satisfying this leaves the raider with profits $-c$
- thus, no takeover is mounted ever
- rationality allow inefficient management due to free-riding
  - good management is a public good, benefiting all shareholders
  - those not selling shares free-ride on those who do, preventing takeover
  - standard approach: how exclude the free-riders?
- but as takeovers do occur, how do we get them to occur in theory?

Valuation differences and private benefits

1. prospective minority shareholders value the firm under new management at $\tilde{v} < \hat{v}$
   - why? Maybe different risk preferences
   - thus, sell if $v + P \geq \tilde{v}$
   - for a raid to be profitable, it must be that $\hat{v} \geq v + P + c$
   - necessary condition:
     $$\hat{v} \geq \tilde{v} + c$$
   - convincing? *De gustibus non est disputandum*: playing with preferences drives the result

2. raider gains benefits of $\hat{w}$, beyond market value of firm $\hat{v}$
   - why? 'synergies'
   - if $\hat{w} > c$, can offer premium of $P = 1$
   - if existing shareholders are dispersed, they extract all surplus firm value, $\hat{v} - v = 1$
   - (large shareholders may even be able to extract some of $\hat{w}$)

Toehold

- suppose that $\hat{w} = 0$ again, but that raider has acquired a toehold of $\theta < \kappa$ fraction of shares
- as raider gains $\theta(\hat{v} - v)$ from rise in firm's market value, toehold functions like benefit previous considered

$$\hat{w} = \theta(\hat{v} - v)$$

thus, previous analysis goes through
- (recall Tirole's anatomy of a takeover?)

Dilution

- raider extracts fraction of gains ϕ from shareholders who didn't sell
  1. asset sale, share issue at discount to raider or raider affiliate
  2. asset purchase at premium from raider or raider affiliate
- thus, firm's value to minority shareholders post-raid falls to

$$\tilde{v} = \hat{v} - \phi$$

  while raider's benefits climb to

$$\hat{w} = \phi\left(\hat{v} - v\right) = \phi$$

- if raider offers $v + P \geq \hat{v} - \phi$ all existing shareholders sell
- raider then owns whole firm, is indifferent between dilution and not
- little evidence of use in the UK [Vickers and Yarrow, 1988]
- but is Nash threat: never used in equilibrium
- is this possible?
  - shareholders can allow in constitution
  - may be fiduciary responsibility to minority shareholders
  - subtler dilution: use debt-laden shell company to acquire, then merge into target

Reputation

- shareholders may hold shares in other firms as well
- ∴ may expect to try to influence other firms' management as well
- may develop 'tough' reputation re: management by offering to sell shares at loss instead of free-riding
- this may lead managers in other firms to work harder
- again, a Nash threat
- related thinking: Eaton and Engers [1999] on economic sanctions

Compulsory acquisition

- UK Companies Act, 2006 has 'squeeze out' provisions
- if raider has "acquired or unconditionally contracted to acquire"
  - not less than 90% in value of the shares to which the offer relates, and
  - in a case where the shares to which the offer relates are voting shares, not less than 90% of the voting rights carried by those shares (Section 979)

  then the raider can compel sale of the remaining shares to which the tender offer applies, at the offer's price
- eliminates free-riding by final 10%
- Vickers and Yarrow [1988] report that a majority of UK mergers and acquisitions offers were contingent on a 90% acceptance rate
- problem: unless accompanied by ϕ dilution, cost of declining initial offer small (everyone prefers to be in that last 10%)

Inefficient takeovers and hubris

Even efficient management can be taken over:

1. may have managerial incentives (e.g. larger salary if manage larger firm) rather than profit motive
2. if taxes distort pricing of financial assets, raider takes over for tax shelter
3. hubris [Roll, 1986]: over-confident managers win takeovers
   - existing shareholders do not sell if the bid is below their valuation of the firm
   - if they have an informational advantage, successful takeovers are likely to pay more than the firm is worth
   - related thinking: hiring the lowest cost contractor
     - similar model (takeover bids are open auctions), but in reverse
     - contractor with smallest budget may have most under-estimated costs
     - ∴ likely to exceed budget when carrying out project
   - Malmendier and Tate [2005]: market won't fund overconfident CEO, making overconfident CEO more sensitive to internal cash flow (overconfidence measured by degree of investment in own firm)
   - n.b. is different from mistakes as explanation

Introduction

- most corporate legal codes allow a firm to declare bankruptcy when its **managers** deem the firm's NPV to be negative (often once it can no longer pay creditors)
  - the firm's resources are no longer profitably engaged
  - bankruptcy releases them to seek profitable projects elsewhere
- perfect capital markets assumption: bankruptcy is a costless reorganisation of resources
- it is not
  - **direct costs**: professional fees, including lawyers', accountants, managers', etc.
  - **indirect costs**: lost sales, opportunity costs
  - **control costs** from shifting rights [Fama, 1978, ★] à la debt overhang
  - costs may be particularly high during **fire sales**, when buyers with the highest valuations are themselves credit constrained [Shleifer and Vishny, 2011]

Consequences for Modigliani-Miller

[if] an individual can borrow using [a firm's] securities as collateral (so that if his return from the securities is less than his borrowings, he can forfeit the securities) the value of the firm is invariant to the debt-equity ratio. [Stiglitz, 1969]

the firm's valuation will depend on its debt-equity ratio [when investors' expectations differ] ... there will be, as a consequence, an optimal debt-equity ratio ... the real decisions of the firm (e.g., its investment and choice of technique) cannot be separated from its financial decisions (the two must be made simultaneously); and ... the real decisions of the firm may not be productively efficient. [Stiglitz, 1972]

one finds a gap in the standard proof of the Modigliani-Miller theorem. Usually one applies an arbitrage argument to show that, as a firm changes its debt-equity ratio, investors in shares and bonds adjust their portfolios so as to leave their overall return patterns unchanged. No such arguments are given for other securities related to the firm; in particular, for margin investments and for margin loans that serve to finance those margin investments. Without an analysis of these securities, the proof of the Modigliani-Miller theorem is simply incomplete. [Hellwig, 1981]

How much does bankruptcy cost?

bankruptcy costs are very heterogeneous. Moreover, bankruptcy costs are measurement sensitive. For example, the conclusions one draws depend on whether one uses at-bankruptcy declared values or end-of-bankruptcy declared values, whether one believes the value declarations filed by management, and whether one reports means or medians. At the onset of bankruptcy, the eventual costs are quite predictable and different across cases. The regression suggests fitted values that range between 0% and 20% of assets. [Bris et al., 2006]

Example (Bank of Credit and Commerce International)

BCCI's liquidators trying to claim $1 billion from Bank of England 14 years after its collapse in 1991

Example (JPMorgan Chase v. Lehman Brothers Holdings)

JPMorgan said the case, filed in U.S. Bankruptcy Court, should be moved to federal court in light of the U.S. Supreme Court's contentious June ruling in former Playboy model Anna Nicole Smith's inheritance battle.

Goals of a bankruptcy procedure

Bankruptcy laws help people who can no longer pay their creditors get a fresh start - by liquidating assets to pay their debts or by creating a repayment plan. Bankruptcy laws also protect troubled businesses and provide for orderly distributions to business creditors through reorganization or liquidation. (US Courts)

1. ex post efficiency: maximise the value received by the creditors
2. ex ante efficiency: ensure that managers take the efficient action
   1. how allow early planning without de-stabilisation (e.g. HMV)?
   2. how have harsh enough bankruptcy for managers to avoid it, without avoiding $NPV > 0$ actions (q.v. Povel [1999])?
3. preserve absolute priority (APR) of claims (more contentious)
   1. deviations from APR used to sweeten deal for junior creditors, although declining [Eckbo and Thorburn, 2009, p.45]
   2. often requires bankruptcy judge to know firm's value [Sigurdsson, 2010]

Why have a separate bankruptcy code?

- with a single creditor
  - default should shift ownership from the debtor (firm) to the creditor
  - no need for 'bankruptcy' law: just upholding a debt contract
- with multiple creditors, more complicated
  - creditors may race to secure judgments, knowing the firm cannot pay them all
  - ∴ public bad component (and to debt more generally)
  - race may inefficiently break firm up, reducing its value
  - ∴ may be a role for a formal bankruptcy procedure
- why not first enforce firms' own bankruptcy contracts?
  - gives courts discretion, perhaps allowing economic dynamism
  - but discretion may be hard for courts to apply to search for best judgment
    1. non-standard contracts may require expertise not readily available in courts (e.g. GM filing in New York)
    2. how should a court rule when bankruptcy has occurred in a state (or as a result of a state) for which the contract is incomplete?

Liquidation versus restructuring

Many countries have two forms of bankruptcy proceeding

1. restructuring
2. liquidation (often via auction: market-based)

1. which of these performs better?
2. who should decide which is used?
3. would it be better to have a single system, rather than giving anyone the choice?
   - Schwartz [1997] discusses both the issue of mandatory rules v freedom of contract, and possible inefficiencies associated with allowing managers to choose the bankruptcy technique

Structured bargaining / workout

- Chapter 11 under US law, administration under UK insolvency law
- firm placed under management; claims against it frozen
- creditors bargain according to state-defined rules, typically before a judge
- two decisions made at once by the judge:
  1. what should happen to the company (remain intact, break up, etc.)?
  2. who should get what?
- making two decisions with a single instrument can be inefficient
- procedure can be very costly, taking years: e.g. if debts $\approx$ firm's value at liquidation, shareholders may hold out for lengthy reorganisation
- Eckbo and Thorburn [2009] cite 2003 study: "distinct trend in the U.S. toward greater reliance on the auction mechanism of Chapter 11"

Liquidation (esp. cash auctions)

- Chapter 7 under US law, liquidation under UK insolvency law
- trustees supervise asset sale, charged with getting highest price for creditors
- with perfect capital markets, this is fine
- however
  - transaction costs (e.g. quickly finding new group of owners), asymmetric information etc. may make it difficult to raise all the money to buy a distressed firm intact
  - this reduces the competition for the whole firm, reducing its sale value
  - also increases the likelihood of selling firm piecemeal
- ∴ want a bankruptcy procedure that is robust to market imperfections

US business bankruptcy cases commenced

Year ending	Total	Chap 7	Chap 11	Chap 12	Chap 13
30/09/10	58,322	40,977	12,279	707	4,256
30/09/09	58,721	40,225	13,439	487	4,424
30/09/08	38,651	26,578	7,962	332	3,727
30/09/07	25,925	16,914	5,317	361	3,281
30/09/06	27,333	18,258	5,345	376	3,277
30/09/05	34,222	23,313	5,776	364	4,649
30/09/04	34,817	20,243	9,436	238	4,799
30/09/03	36,183	21,008	9,185	698	5,201
30/09/02	39,091	22,574	10,702	322	5,414
30/09/01	38,490	22,800	9,787	379	5,481
30/09/00	36,065	20,687	9,135	551	5,661
30/09/99	38,625	23,499	8,238	811	6,047
30/09/98	47,125	29,229	7,884	879	9,098
30/09/97	54,252	31,862	10,092	966	11,297

Bankruptcy law varies around the world

Claessens and Klapper [2005] 1990s 35-country survey (on Lexis)

1. rule of law: efficient judicial system positively, significantly associated with bankruptcy
2. creditor rights negatively, insignificantly associated with bankruptcies
   1. no automatic stay on assets (creditors can seize assets of bankrupt firm) negative, significant
   2. restrictive reorganisation (restructuring in less than 90 days) positive, significant
   3. secured creditor priority insignificant
   4. mandatory management turnover insignificant

- strong creditor rights especially important when judicial system is weak
- sample excludes countries without working bankruptcy laws (e.g. many E. Asian before 1997 crisis), and those which don't collect bankruptcy data (e.g. many L. American)
- UK receivership procedure does not stay claims [Eckbo and Thorburn, 2009]?

Example (Sweden's 'single' system system [Eckbo and Thorburn, 2009])

- automatic stay of claims
- control shifted to court-appointed trustee, responsible to all creditors
- all labour contracts, including management's, terminated
- 'experts' estimate value of company if liquidated piecemeal
- auction asks whether anyone will pay premium to keep firm intact
  - bidders can bid for individual assets, or entire firm
  - "highest bidder wins" (means what in a combinatorial auction?)
  - if no bids for going concern, then sold piecemeal
  - creditors paid out of proceeds in strict APR
- auction prepack: management may arrange a buyer just before filing
  - trustee must approve or search for competing bids
- for unsecured debt, Sweden has composition procedure
  - must offer secured creditors & priority claims (e.g. wages, taxes) 100%, junior 25% repayment
  - thus, too expensive if firm 'really' bankrupt ⇒ rarely used

Sweden v Chapter 11 [Eckbo and Thorburn, 2009]

issue	evidence
direct costs	$4 - 6\%$ of book value (🇸🇪)
	$1 - 10\%$ but larger firms (🇺🇸)
time in bankruptcy	2 months (🇸🇪); 2 years (🇺🇸)
creditor recovery	35% (🇸🇪); 60% or 41% (🇺🇸)
firm survival	75% intact (🇸🇪); 60% intact (🇺🇸)
fire sales	only if piecemeal (🇸🇪)?
post-bankruptcy performance	survivors on par w non-bankrupt (🇸🇪)
	$\frac{2}{3}$ underperform (🇺🇸)
bankruptcy refiling	one third in both cases (comparable?)
CEO turnover	61% CEOs not rehired (🇸🇪)
	75% CEOs out in 2 yrs (🇺🇸)

Costs of liquidation versus restructuring

Chapter 7 liquidations are not cheaper than Chapter 11 reorganizations, particularly after we control for endogenous self-selection of firms into bankruptcy procedure. Bankruptcy professionals (attorneys, accountants, trustees) regularly end up with most of the post-bankruptcy firm's value in Chapter 7. [Bris et al., 2006]

Eckbo and Thorburn [2009]

- as US managers decide which bankruptcy chapter to use, may use Chapter 11 just for worst-off firms; thus, "reported recovery rates in Chapter 11 auctions provide a downward biased estimate"

Debt-for-equity swaps: the Aghion-Hart-Moore proposal

1. firm's debt wiped out upon declaration of bankruptcy
2. debt converted into equity: debtholders become shareholders
3. original creditors' claims ranked by a judge, with the original shareholders being the most junior claimants

- by restoring solvency, returns to 'normal' management of a (distressed) firm
- more importantly, squabbling debtholders converted into co–operating shareholders:
  - as debtholders, everyone wants to be paid first; this plan is infeasible in the aggregate
  - as shareholders, everyone wants the firm's NPV to be maximised
- this agreement reduces transaction costs

Example (General Motors' Chapter 11 bankruptcy)

- Nov 2008: GM predicts can't fund operations beyond mid–2009
- Dec 2008: government rejects bailout, offers bridging finance
- 1 Jun 2009: Chapter 11 filing (US$82bn assets, US$173bn liabilities)
- 10 Jul 2009: back in business after prepack (à la AHM?)
  - valuable assets 'sold' to NGMCO Inc., Vehicle Acquisition Holdings LLC ('new GM')
    - ownership structure: USG (61% due to T-bill sale), Queen (12%), unions (18%), original bondholders (10%)
  - ('old') GM changes its name to Motors Liquidation Company
    - debt left with this entity, some less profitable assets
    - negotiations with creditors expected to last 2-3 years
    - original shareholders wiped out
  - slower proceedings would have hurt sales to consumers, rental fleets
- Feb 2011: GM posts first annual profits since 2004
- Jan 2012: G.M. Regains No. 1 Spot in World Automaking

1. why doesn't this happen more often?
2. did this preserve APR?

- easy to drop 'only wealth matters' assumption if strengthen others [Fama, 1978, ★]
  1. either riskless debt, or
  2. covenants, me-first rules protect existing asset holders
- this imposes arbitrary restrictions on firms' financing possibilities
- perfect capital markets and equal access also allow result
  1. whatever securities firms initially issue ...
  2. investors issue their own to take the positions best for them
  3. thus, whatever expropriation subsequently occurs happens independently of firms' financing decisions given the previous step
- considerations more technical, so not pursued

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When should a project be undertaken?

- when the project makes a profit
- in finance, often net present value, where:
  - net of costs (including rental cost of capital)
  - present discounts costs, revenues to a common date, yielding a single number, allowing a complete ordering
- calculation of NPV will be taken as given, and covered in the first problem set
- *should* undertake projects with NPV > 0
- real options: may require a positive hurdle for irreversible investment in the presence of uncertainty [Dixit and Pindyck, 1994]
- next slide: reminder on expected values

◂ what is CF?

Expected values: probability weighted averages

Example (The expected value of a six sided die roll)

$$\frac{1}{6}\left(1 + 2 + 3 + 4 + 5 + 6\right)$$

$$= 1 \times \tfrac{1}{6} + 2 \times \tfrac{1}{6} + 3 \times \tfrac{1}{6} + 4 \times \tfrac{1}{6} + 5 \times \tfrac{1}{6} + 6 \times \tfrac{1}{6} = \sum_{x=1}^{6} xf\left(x\right)$$

where $f\left(x\right)$, the density function, describes each outcome's probability.

When the random variable is continuous, the sum is replaced by an integral

$$\mathbb{E}\left(x\right) = \int xf\left(x\right) dx.$$