Class 16 Firms as portfolio of projects

What explain financial structure

1. Dealing with the market

Should firm hedge?

Why portfolios of projects

2. Dealing with Government

Taxes and Debt Vs equity and retained earnings

Regulation and project selection

3. Sunk cost and firm specific capital

Bankruptcy

A simple signaling model

Dealing with the market

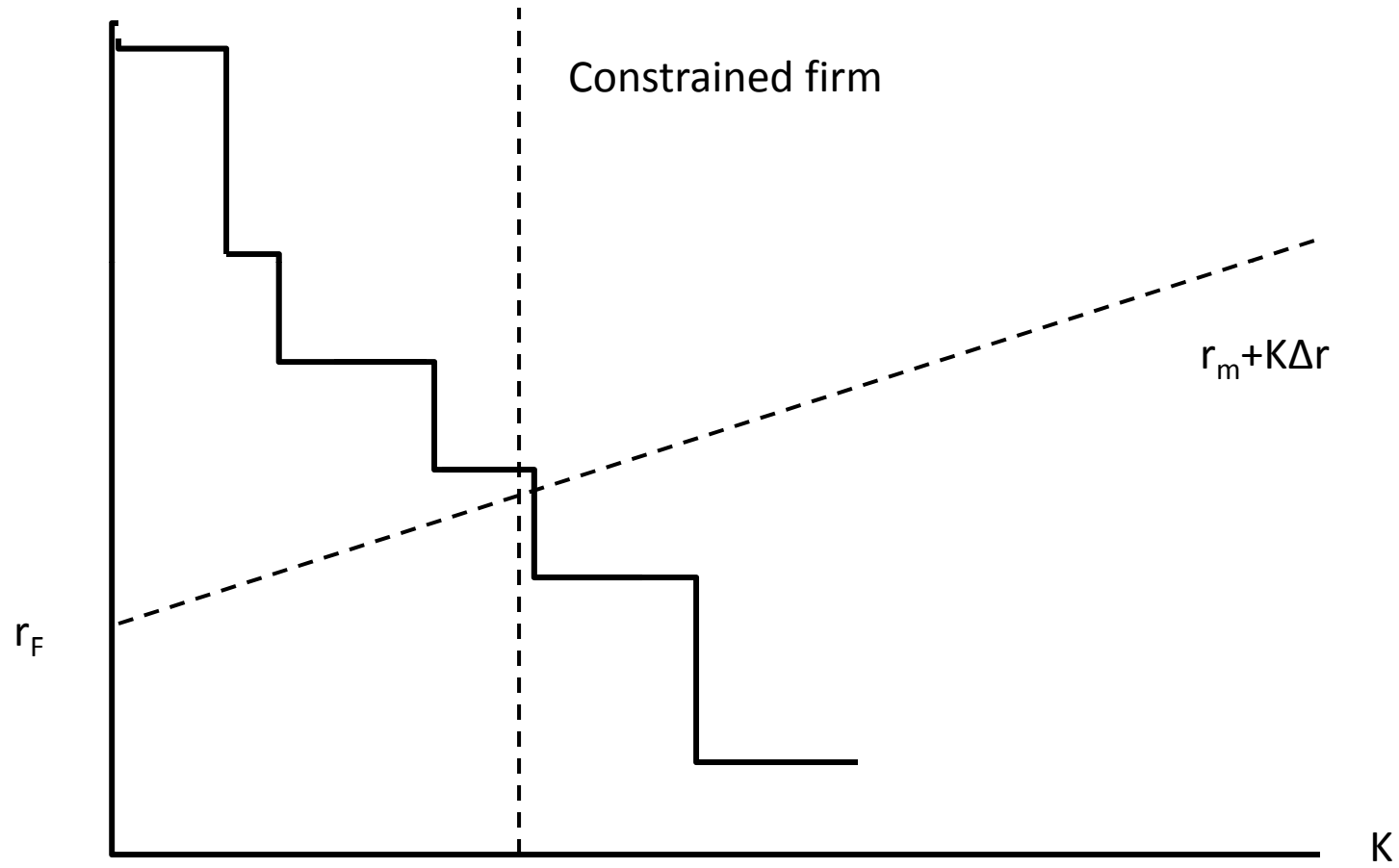
- **Here we will take regulation as fixed and ask how is being publicly traded affect strategies of the firm**
- **Maintain the assumption that maximizing shareholder value is the (social) goal**
- **Accept that management may have other goals.**
- **In doing so what do we care about?**

Choosing β

- Shareholder has an option on the stock at a strike price (V-B)/n
- Management has an option on the stock a strike price S> (V-B)/n.
- Suppose We face two projects
- Project 1 has expected return r
- Project 2 has two states(r_l,r_h)
  - $qr_l+(1-qr_h)= r_m$ and $r_m > r_f + \beta r_m$
- Both are worth doing (the first for sure because it is riskless and will thus lower the firm's β) and the second one can be thought of as not changing β (success or failure is idiosyncratic)
- Manager strictly prefers the riskier project
  - His option only vests if prices go up
  - He does not care about the down side
- Can set up situation where shareholder prefers the less risky project

Choosing Projects

- Now suppose we have a set of N projects of each costs k_i and has an expected return r_i
- Start with a risk neutral firm that can secure capital at some cost $r=r_m+K\Delta r$
  - it pays some baseline return but then cost goes up as it raises more capital.
- That firm should start order the projects by expected return and start with the one with the highest return and move down the schedule until the cost of capital become greater than the return.
- If the risk neutral firm is constrained (supply schedule is vertical) than it just pick the best projects it can fund.


Constrained firm
$r_m+K\Delta r$
r_F
K

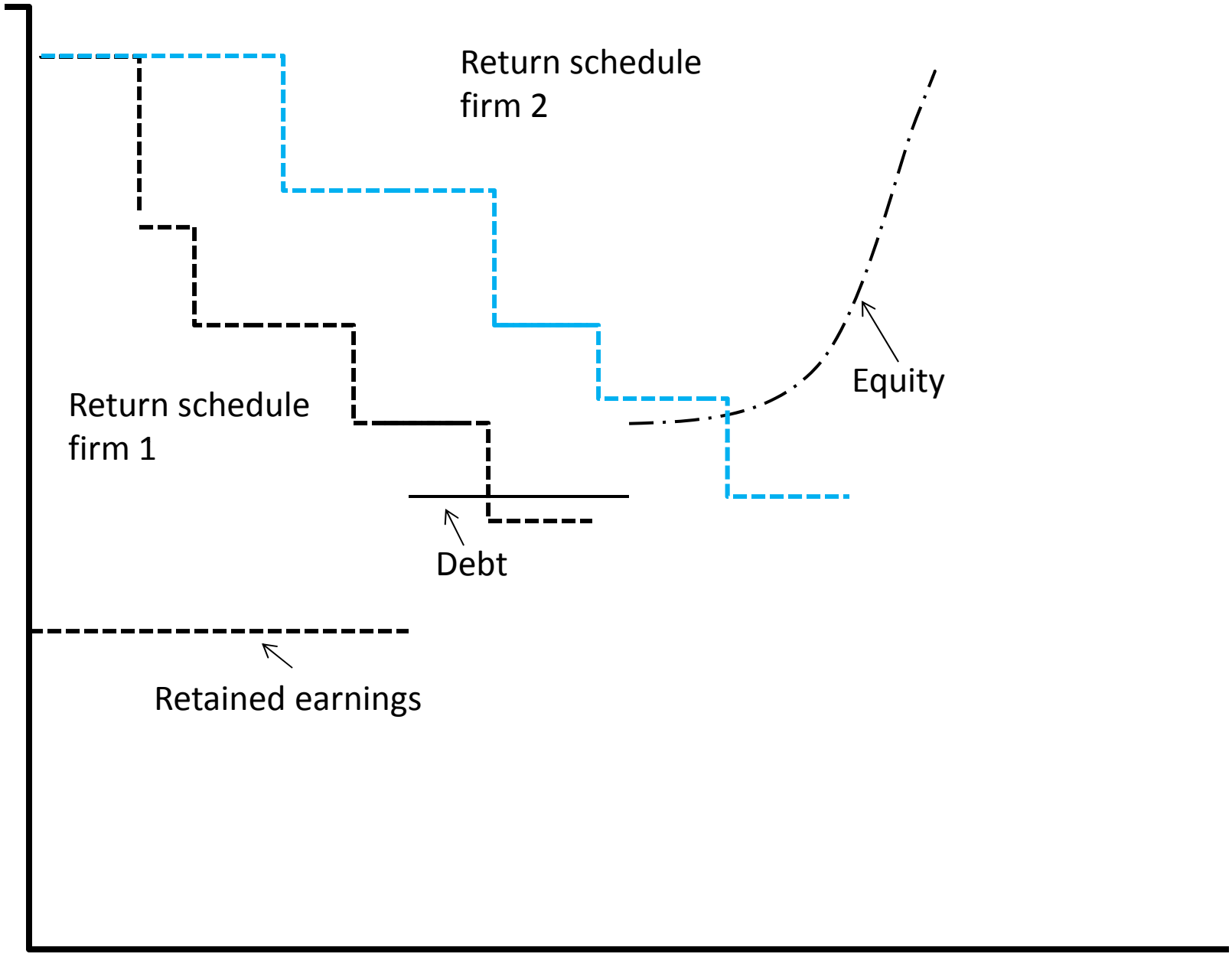
Choosing Projects

- But no one is blind to risk. So mean return can't be the only criterion.
- So clearly there has to be another element and that involves the variance covariance matrix of returns.
- At first glance: looks like the portfolio project
- But is that right?
- Project size and firm size

Firm funding

- Three sources of funding
  - Retained earning
  - Debt
  - Equity
- Problem of cost of capital

- Cost
- Retained earning is cheapest because the return there has to be the cost of borrowing minus the cost of intermediation.
- Debt is second cheapest because it is less risky than equity as long as $\beta>0$. (but you have to pay the market price plus the cost of intermediation).
- Equity is most expensive because it is riskiest (you have to commit more flow resources).


Return schedule
firm 2
Return schedule
firm 1
Equity
Debt
Retained earnings

Source of variation in access to finance

- Age
  - You can't have much retained earning if you are young.
  - Apple 100 billion in cash is the product of a decade of very high profits
- Tangible Assets
  - This involves past successful investment that you can collateralize.
  - These could be financial or real assets.
  - Difference between railroads and law firms.
- Debt equity ratio
  - If you have borrowed a lot in the past
- Equity price
  - This is obvious and feeds back into the other three
  - But also what is β. If it is low then the cost of equity is also low.

Old Economy firms

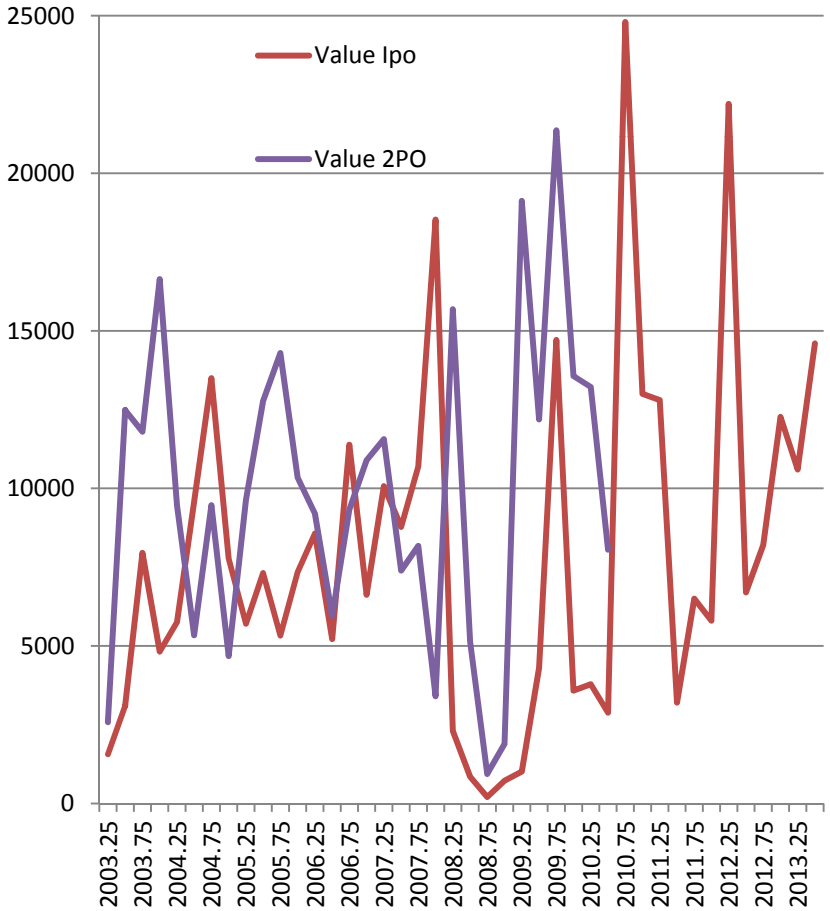
- Have retained earning and tangible assets
- Can finance through debt or retained earnings
- Often their β are large because they are business cycle sensitive (they have a large market share in a stable pro-cyclical sector)
  - Equity not attractive
- So M&A or investment projects financed by issuing new debt or for cash
  - Secondary public offerings are rare

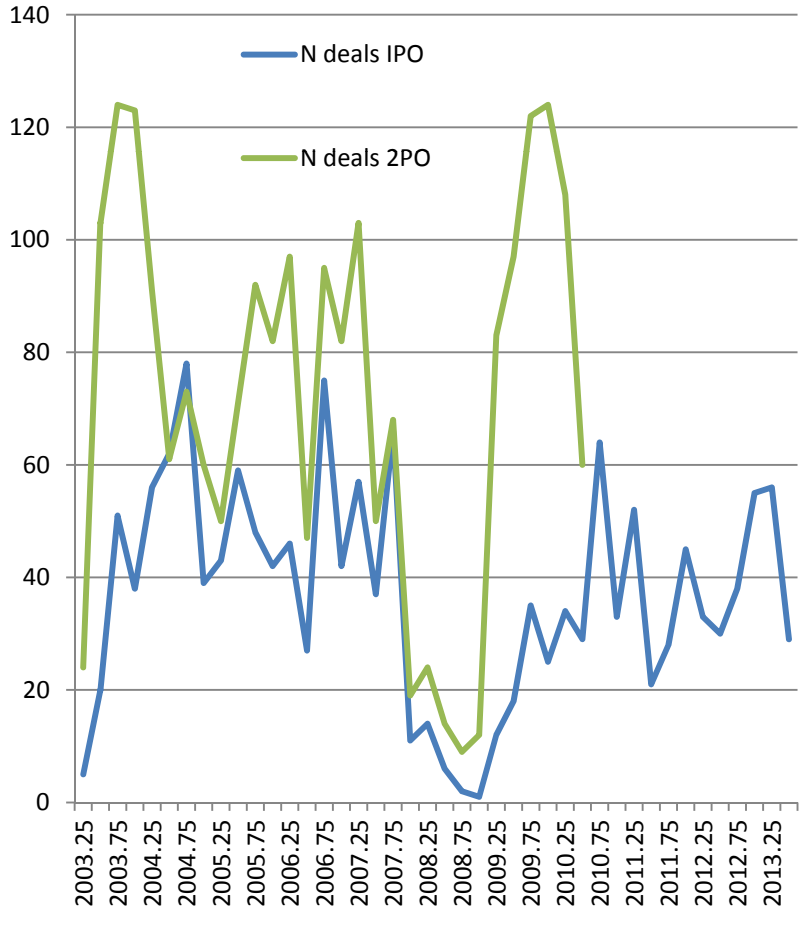
New Economy firms

- Have few retained earnings
- Have high investment rates
- Sectors that are growing and thus may be far less pro cyclical (that is the “new”)
- May have global rather than national reach (so less sensitive to local conditions)
- So low β (note that does not mean they have high success rates)
- Makes issuing equity to finance investment or acquisitions much more attractive
- At the extreme case β is close to zero but risk of default is non trivial and thus the cost of debt is very close to the cost of equity.

Evidence

Value of IPOs and 2POs Note these are about the same magnitude.
total market capitalization on average 18 trillion dollars (4100 listed companies).
So 2po are small and rare frequency is less than 1% per year.





If not equity offerings

B. Stable leverage regimes

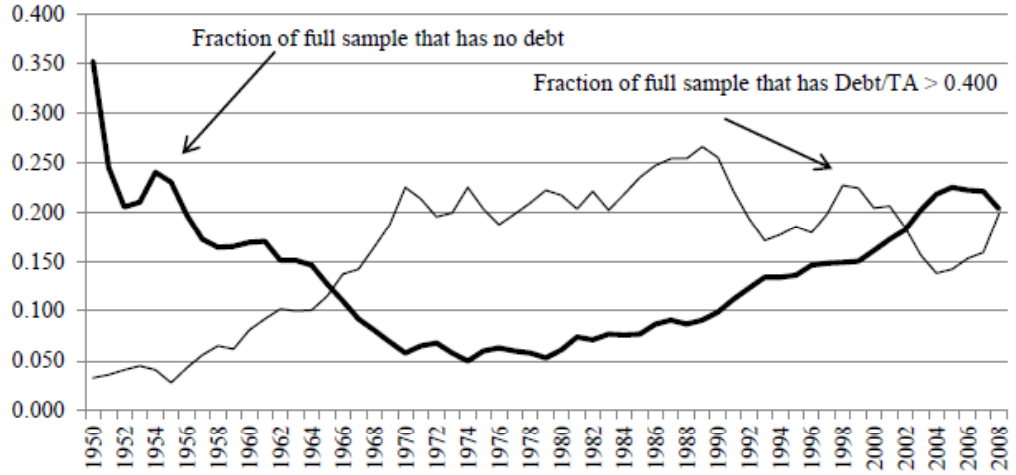
Firms listed at least 20 years:	% of firms with *Debt/TA* continuously in specified range for at least: 10 years	20 years	30 years	40 years	Median # of years of longest stable regime
Debt/TA range ≤ 0.050	21.3%	4.2%	n.m.	n.m.	6.0
Debt/TA range ≤ 0.100	50.3%	9.9%	n.m.	n.m.	10.0
Debt/TA range ≤ 0.200	85.7%	36.9%	n.m.	n.m.	17.0
Constant composition sample:					
Debt/TA range ≤ 0.050	51.6%	7.6%	2.5%	0.0%	10.0
Debt/TA range ≤ 0.100	94.9%	28.0%	7.6%	1.3%	16.0
Debt/TA range ≤ 0.200	100.0%	87.9%	51.0%	14.6%	30.0

Companies do change their uses of capital, they do not maintain a constant leverage

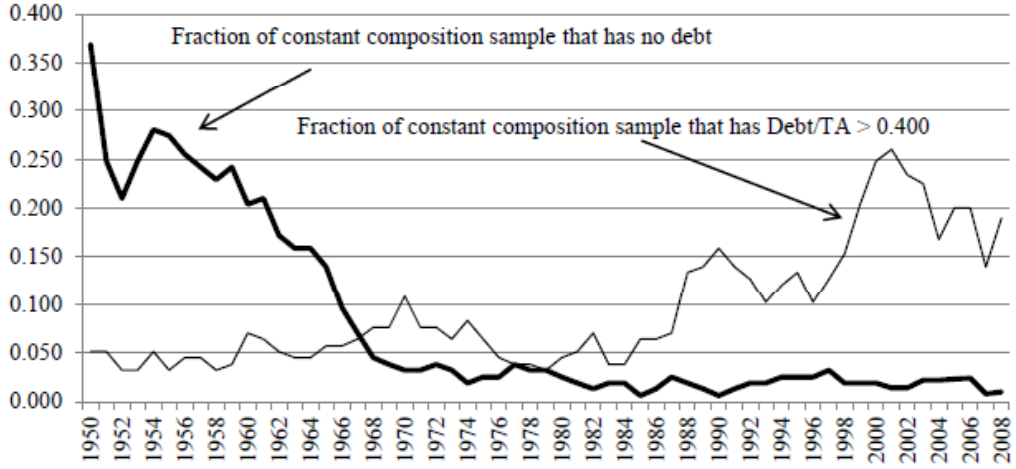
Since they are not varying their equity position very much, it has to be that they strategically use debt to make acquisitions, to deal with governance issues

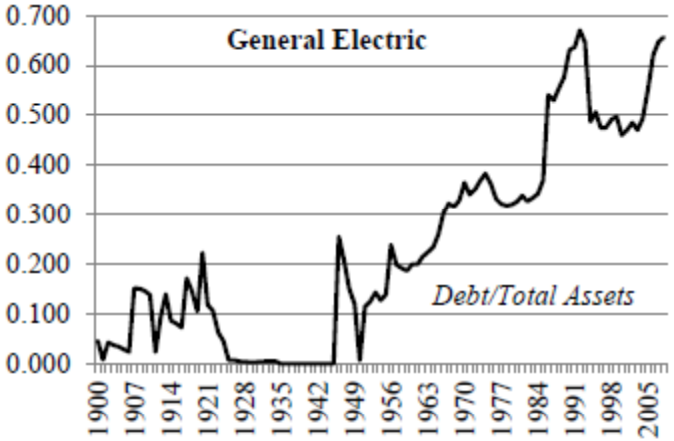
Source: **How Stable Are Corporate Capital Structures?** HARRY DeANGELO and RICHARD ROLL Journal of Finance

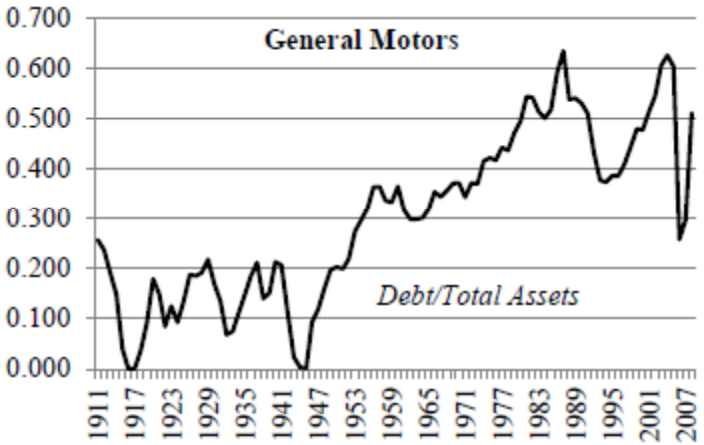
A. Full sample incidence of conservatively levered and highly levered firms

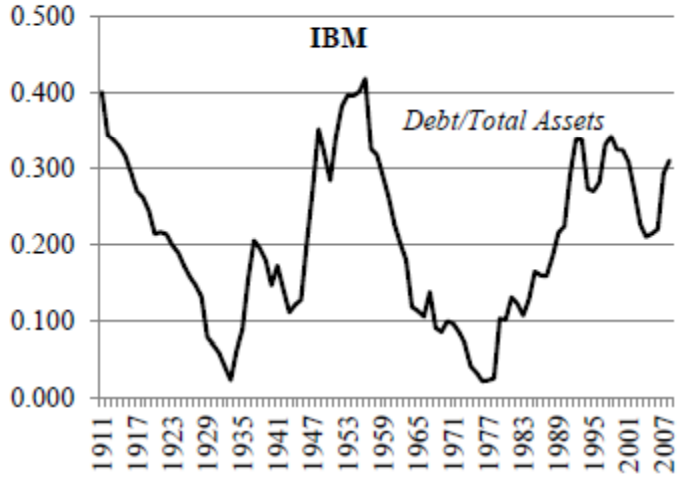


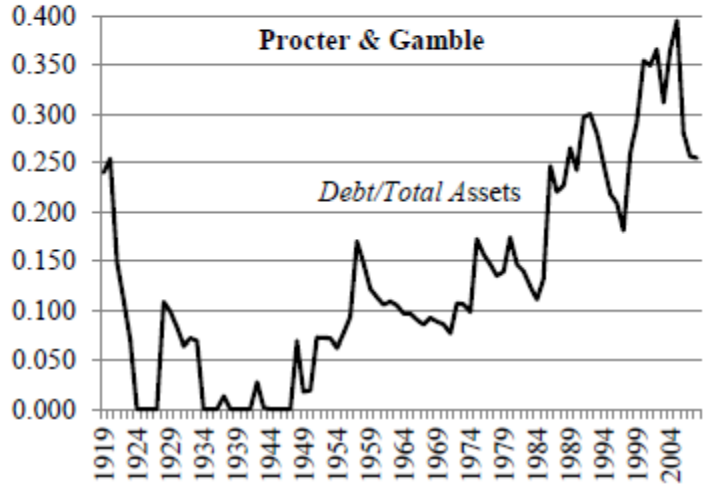
B. Constant composition sample incidence of conservatively levered and highly levered firms

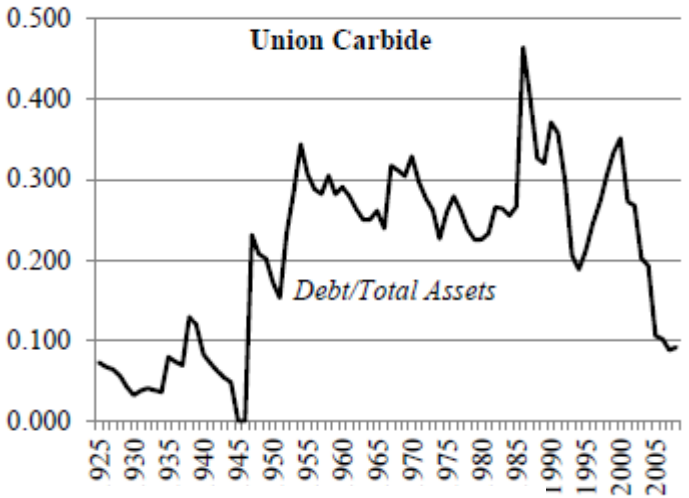


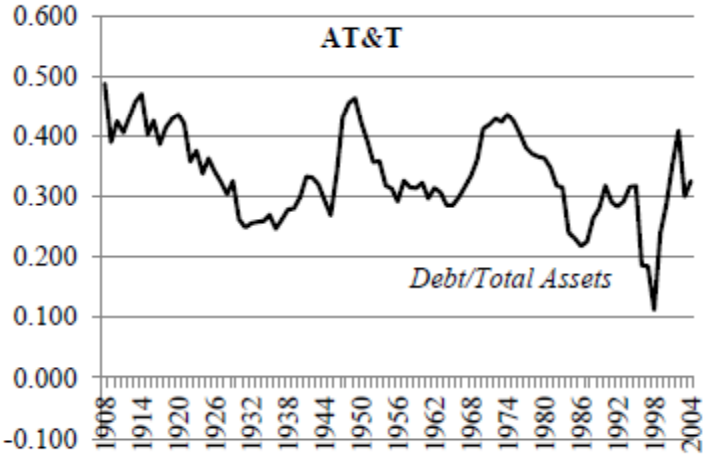

General Electric
Debt/Total Assets
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1900 1907 1914 1921 1928 1935 1942 1949 1956 1963 1970 1977 1984 1991 1998 2005

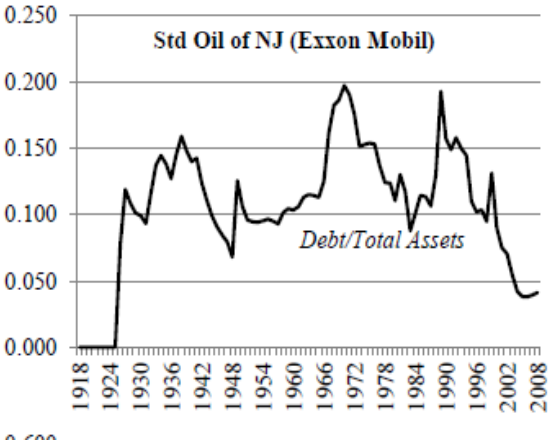

General Motors
Debt/Total Assets
0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
1911 1917 1923 1929 1935 1941 1947 1953 1959 1965 1971 1977 1983 1989 1995 2001 2007

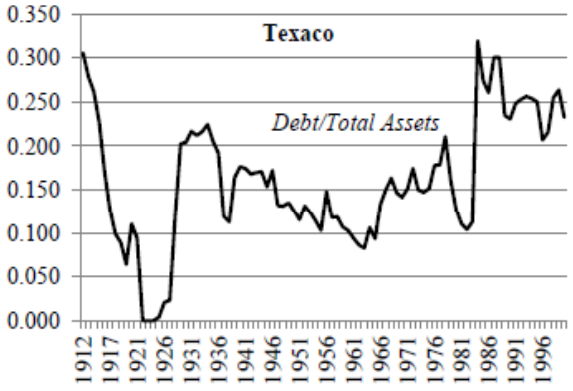

IBM
Debt/Total Assets
0.500
0.400
0.300
0.200
0.100
0.000
1911 1917 1923 1929 1935 1941 1947 1953 1959 1965 1971 1977 1983 1989 1995 2001 2007

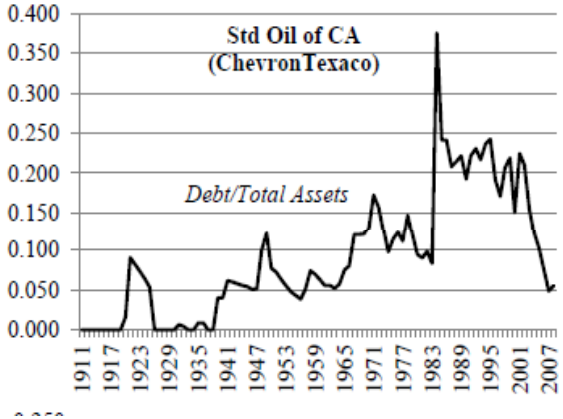

Procter & Gamble
Debt/Total Assets
0.400
0.350
0.300
0.250
0.200
0.150
0.100
0.050
0.000
1919 1924 1929 1934 1939 1944 1949 1954 1959 1964 1969 1974 1979 1984 1989 1994 1999 2004











General trend upwards but there are some companies that really buck the trend. Big changes are associated with major moves in the Merger and aquisition market

Dealing with Government

1. Taxes and Financial structure

- From inception corporations are taxed differently than individuals
  - They owe corporate profit taxes
  - They can expense interest on debt.
  - And they negotiate depreciation and other allowances
  - Since 1917. owners of equities face different taxes on dividends and capital gains.
- Two set of implications
  - First the famous double taxation of corporate profits
    - This pushes corporation towards more leverage, because each dollar it returns to bondholders as interest is only taxed once (on the owner's filing).
    - This is a distortion (firms must be risky because they are induced to be leveraged for tax avoidance reasons)
  - Second no dividends
    - Because the tax on dividends involves marginal income (usually the rate is 25% or higher) while the tax on capital gains involves a flat 20%. Investor prefer to take their income as capital gains than as dividends
    - That leads firms to hoard profits or to distribute them as share buy backs

Blackberry

- Today company value about $5 billion. BlackBerry's corporate filings show that over the years it distributed $3.5 billion to shareholders mostly on share buybacks mostly in 2008 and 2009, when share prices were high
- BlackBerry's financial strategy was a classic "sell low and buy high." Over the years, BlackBerry executives and employees exercised options to acquire 83.3 million shares, adjusted for two stock splits. On average, they paid $4.38 a share.
- Those prices were, of course, well below the market value of the shares at the time. The exercise price is equal to the market price when the options are issued, but the executive has up to 10 years to exercise them, and will do so only if the price has increased.
- Options do not dilute shareholders' stakes because the company acquires and retires an offsetting number of shares. BlackBerry did just that, buying 85.5 million shares that it canceled. It bought an additional 12.3 million shares that it did not cancel but held to provide stock to issue directly to executives. Average price $36. The net effect: It took in $365 million from the exercise of options. It paid $3.5 billion to repurchase shares.
- Source Floyd Norris NYTimes August 28 2013

Apple

- Apple starts paying dividend in August 2012
  - Has pay so far $17 per share or 1.54 billion dollars
- As of June 30 2013, Apple held $147 billion in cash, securities and other investments.
- So at this rate it will take Apple 150 year just to pay out its current cash horde.
- It also intends to buy back shares for 10 billion dollars starting in 2013 even if it does this every year it will still take about 10 year just to get rid of all this cash (and its net income was 37 billion dollars last year)
- Some of this is long term strategy (its in Apple's corporate culture to be totally independent from the market) and some is tax avoidance.

Regulation and project selection

- Beyond just taxes the government wants to induce companies to do the right thing
- Regulation
- Taxes (depreciation, investment credits, export credits)
- Two implications firms that are successful must learn to deal with government.

Final issue: finance and firm selection

- So finance helps with incentives
  - By focusing management (LB0)
  - By producing incentives (Options)
- Finance can help your bottom line
  - By helping you chose projects
  - By helping you pick the right funding
  - And deal with taxes
- Finance can also help select firm

Two firms

- Firm 1 and Firm 2 both need to raise K. if they fail they both have a liquidation value of L. If they succeed they both have a gross return π.
- Firm 2 is better than firm 1 because its probability of success is higher.
- The founders are risk averse and they initially contemplate an all equity deal. Because the market can't tell the two firms apart prices them as a pool, where q is the proportion of type 1 firm and (1-q) the proportion of type 2 firms

Net present value

- The net present value tells how much of the firm the principal has to give up
- $K(1+r)= \alpha[q[(1-p_1)L+p_1\pi]+(1-q)[(1-p_2)L+p_2\pi]]$
- Under perfect information firm 1
- $\alpha_1= K(1+r)/[(1-p_1)L+p_1\pi]$ and firm 2
- $\alpha_2= K(1+r)/[(1-p_2)L+p_2\pi]$
- Because $\pi_1<\pi_2$, $\alpha_2<\alpha<\alpha_1$
- Pooling (being priced together) is bad for firm 2.

Can firm 2 separate using finance

- What it needs to find is a debt equity ratio that is wants that firm 1 does not want.
- Suppose that firm 2 borrows K (and that firm 1 does not follow we need to solve for r' the rate of interest that gets charged.
- $K(1+r)= [(1-p_2)L+p_2 (1+r')K]$
- In firm 2 the principal gets nothing if the firm fails and $\pi_2-(1+r')K$ if it succeeds

For finance to work there are two conditions

Separation

- Condition 1 firm 2 wants to separate

$(1-p_2)U((1-\alpha))L)\ p_2U((1-\alpha))\pi) < p_2U(\pi-(1+r')K)$

- Condition 2 firm 1 does not wants to follow

$(1-p_{1)}U((1-\alpha_1))L)+(p_1)U((1-\alpha_1)\pi) > p_1U(\pi-(1+r')K)$

- If both conditions are satisfied (essentially the firms are different enough)
- Then the financial intermediary offers a menu of

11-25 Class 17, The problem of Mortgages

- Lending on collateral before 1940 (land and real property); Information constraint (value of collateral only known locally); Short maturity, balloon payment, illiquid and poorly diversified
- Solutions (1): Raise the information quality (lien registries); Financial innovation (covered mortgages)
- Solution (2): Mortgage backed securities and no leverage rules; Boom and bust