The Actuarial Profession
making financial sense of the future

Pensions and Corporate Finance Seminar
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Do Financial Markets Take Account of Pension Risk?

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Why is this important

- Pension scheme liabilities are an enormous burden for UK companies.
- The impact of pensions on share prices and cost of capital has been unclear.
- Companies only get credit for de-risking if investors allow for risk in the first place.

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Purpose

Two central questions, is it in a shareholder interest to
1. Fully fund its pension scheme?
2. Minimise investment risk in the pension scheme?

Theory and practice differ, why?

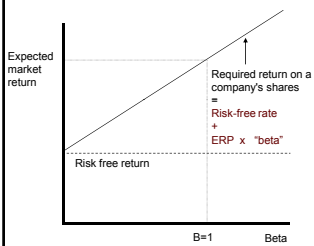Empirical analysis, how are markets allowing for pensions?

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Pension deficit is debt

- Funding pension deficit does not affect shareholder value at first order
- But tax relief is advantageous
- Stranded surplus can be lost value
- Collateralising the pension promise can be lost value
- Management prefer cash in bank
  - (shareholders do not)

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Investment risk is leverage

Expected market return

Required return on a company's shares
=
Risk-free rate
+
ERP x "beta"

Risk free return

B=1   Beta

- 'Expected return' is higher for risky shares (Beta)
- Shareholder value is created by exceeding expected return
- Lower beta »»
  - lower cost of capital »»
    - increase in value
- Taking equity risk in the pension scheme should increase a firm's equity beta
- First order neutral e.g. £100 of equity equals £100 of bonds
- But taxes, stranded surplus risk make equities less attractive

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Balance sheet of company with substantial equity assets

	Today	After 10% market fall	Beta
Underlying business	100	90	1
Pension fund equities	50	45	1
Pension fund liabilities	50	50	0
Market cap	100	85	1.5

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Balance sheet of company with <u>large deficit</u> and substantial equity assets

|	Today	After 10% market fall	Beta
Underlying business	100	90	1
Pension fund equities	50	45	1
Pension fund liabilities	100	100	0
Market cap	50	35	3

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Why is practice so different?

- 2008 - 53% equities, 35% bonds
- 2009 – funding level 85%[1]
- Agency theory - investors and managers have different motives
- Investors do not properly discount share prices for pension risk
- So management get a "free lunch" by supporting equity investment
- Lower cash / higher earnings and no risk penalty

1 Source Pension Capital Strategies. IAS19 deficit at 31 December 2009

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**Companies with large pension liabilities have underperfomed the market over the last 3 years**

Companies with large pension liabilities have underperfomed the market over the last 3 years

$y = -0.3365x + 0.5628$

Pension liabilities as a proportion of market capitalisation

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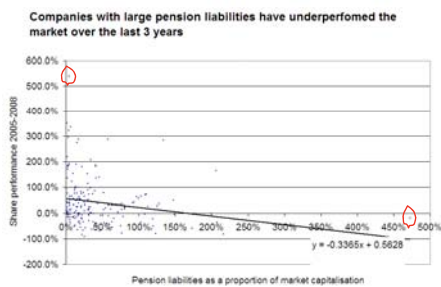
Partly explained by sector performance

|	Coefficient	Lower 95% CI	Upper 95% CI
Intercept	0.55	0.37	0.73
Pension liabilities to market capitalisation	-0.14	-0.34	0.06
Banks	-0.80	-1.36	-0.25
Food/Beverages	-0.48	-1.01	0.05
Media	-0.67	-1.19	-0.14
Mining	2.07	1.48	2.66
Oil and Gas	1.12	0.49	1.75

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In a falling market the returns were lower for a pension burdened company

In a falling market (2007-2008) the returns were lower for a pension burdened company

$y = -16.264x - 11.681$

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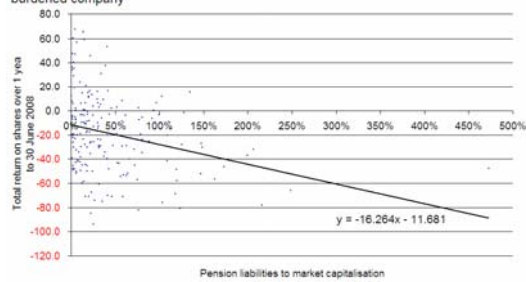
In a rising market the return on equity is higher for those companies with a high pension exposure

In a rising market the return on equity (2006/7) is higher for those companies with a high pension exposure

$y = 7.6405x + 26.514$

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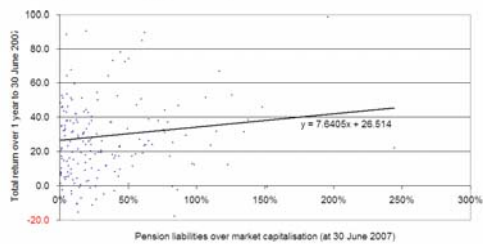
Question 1
Does a firm's equity beta allow for pension liabilities and risk?

- Hypothesis:

    - Firm risk = β_{E+D} = $\alpha + b \times \beta_{pension}$ + ε

- Expect positive correlation between β_{E+D} and $\beta_{pension}$

- Jin, Merton, Bodie (2006) found evidence of this on US data

- However no result of any significance on UK data

- Tentative relationship between firm risk and size of liabilities

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Question 2
Does the spread on a firm's bonds allow for pension liabilities and risk

- Company's obligations split into
    1. Long term debt (LTD)
    2. Short term debt (STD)
    3. Unfunded pension liabilities (deficit) (UL)
    4. Funded pension liabilities (FL)
- Hypothesis

    Bond Yield = $\alpha + b1$ LTD / EV + $b2$ STD / EV + $b3$ UL / EV + $b4$ FL / EV + ε

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Cost of debt correlated with pension deficit and pension risk

	Coeff.	Lower 95%	Upper 95%
Intercept	6.31	4.42	8.20
Funded pension liabilities / EV (b_4)	4.16	-0.58	8.91
Unfunded pension liabilities (deficit) / EV (b_3)	11.99	-18.76	42.74
Long term debt / EV (b_1)	4.02	0.64	7.39
Short term debt / EV (b_2)	2.25	-2.81	7.31

A Company with a deficit of 5% of its Enterprise Value would have a cost of debt 60bps higher.

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Cardinale (2007) result similar for US

Key results:
- Relative size of pension deficits is priced into corporate bonds spreads
- The sensitivity of spreads to deficits is five times higher for high yield companies
- Keeping everything else constant the model predicts
  - a fall in credit spreads of 15bps if the pension deficit is set to zero
  - 119 bps for high yields companies
- Overfunded plans do not reduce credit spreads
- Market perceives residual risk even in fully funded plans.

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Question 3
Has Equity Beta changed over the last 6 years?

- Most conclusive result
- Tested for the correlation between the
  - change in firm's equity beta and
  - the pension scheme
- Fundamentals of the business assumed to stay the same

$$\Delta\beta_E = \alpha + b_1\,\beta^o{}_E + b_2\,P_D/E \times \beta_A + b_3\,P_E/E \times \beta_A,$$

- P_D is the pension scheme deficit
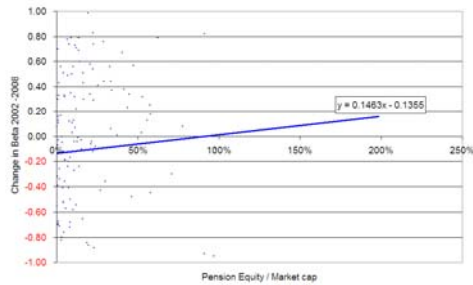- P_E is the value of the equities held by the pension scheme

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Change in Equity Beta 2002-2008 vs. Pension Deficit

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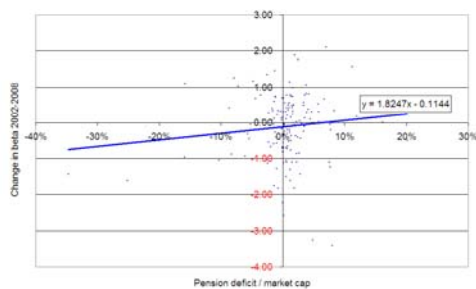
Change in Equity Beta 2002-2008 vs. Pension Equity

Regression analysis

	Coefficients	P-value	Lower 95%	Upper 95%
Intercept	0.54	0.00	0.39	0.70
Pension Deficit / market cap 2008*	2.12	0.02	0.32	3.92
Pension Equity / market cap 2008*	0.79	0.00	0.49	1.09
Banks	0.35	0.06	-0.02	0.73
Financial General	0.13	0.42	-0.19	0.44
Food/Beverages	0.05	0.78	-0.34	0.45
Industrial General	-0.16	0.56	-0.69	0.38
Insurance	0.36	0.03	0.04	0.69
Media	-0.08	0.64	-0.43	0.27
Mining	0.11	0.62	-0.33	0.56
Oil and Gas	0.19	0.36	-0.22	0.60
Pharmaceuticals	-0.16	0.54	-0.69	0.36
Retailers	0.51	0.00	0.18	0.83
Telecomms	-0.19	0.69	-1.14	0.75
Travel & Leisure	-0.09	0.54	-0.37	0.20
Utilities	0.01	0.96	-0.38	0.40

What does this mean?

- Both Pension Deficits and Pension Equity had a strong influence on the change in equity beta.
- The correlation coefficients are
  - Pension Deficit 2.12 and
  - Pension Equity 0.79 respectively
  - The a priori expectation is 0.70 assuming tax at 30%.
- A company with a pension deficit of 10% of its market capitalisation will have seen its equity beta increase by 0.21 other things being equal.
- A company with pension equity holding equal to 50% of their market capitalisation will have seen their equity beta increase by 0.40, other things being equal.

Summary and conclusions

1. Pension burdened companies earned lower returns over the 3 years to 30 June 2008.
2. Pension burdened companies had more volatile share returns
   - In a rising market (2006/7) the value increased further
   - In a falling market (2007/8) the value fell further.
3. No evidence to support the Jin (2006) model that firm risk is correlated to pension risk.
4. Spread on a firm's bonds is higher for a pension burdened company.
5. I found <u>statistically significant</u> evidence that pension burdened company had seen their equity beta increase over the period 2002-2008.
6. Taken together there is a reasonable support for the proposition that financial markets are now taking pension liabilities and pension risk into account

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