

Presentation to :

The Institute and Faculty of Actuaries



The influence of DB pensions on the market valuation of the FTSE 100 companies

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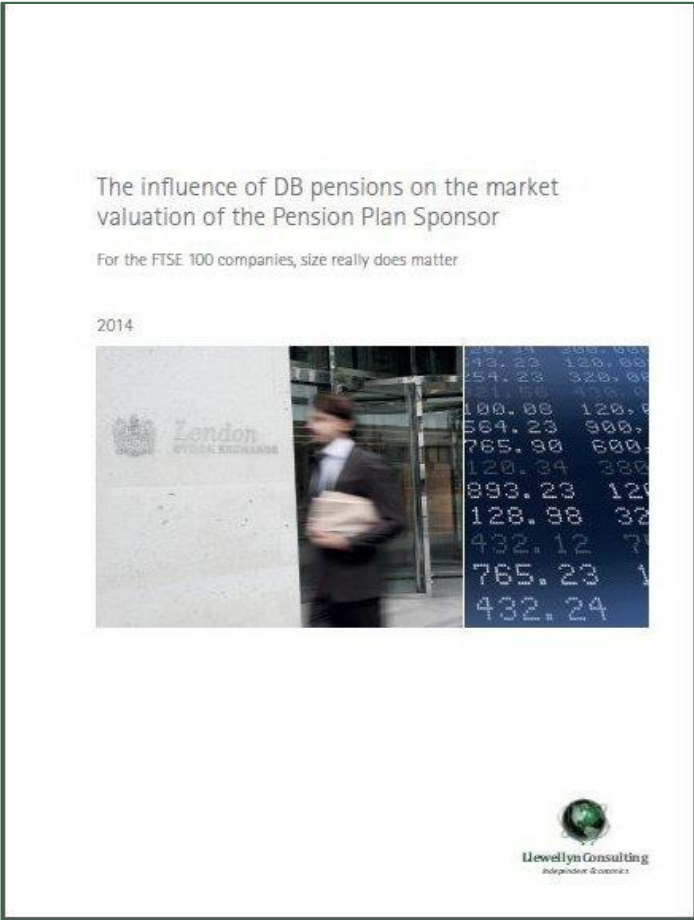
Independent Economics

The influence of DB pensions on the market valuation of the FTSE 100 companies

An independent Study carried out on behalf of the Pension Insurance Corporation, London

And in collaboration with the School of Economics and Finance Queen Mary University, London

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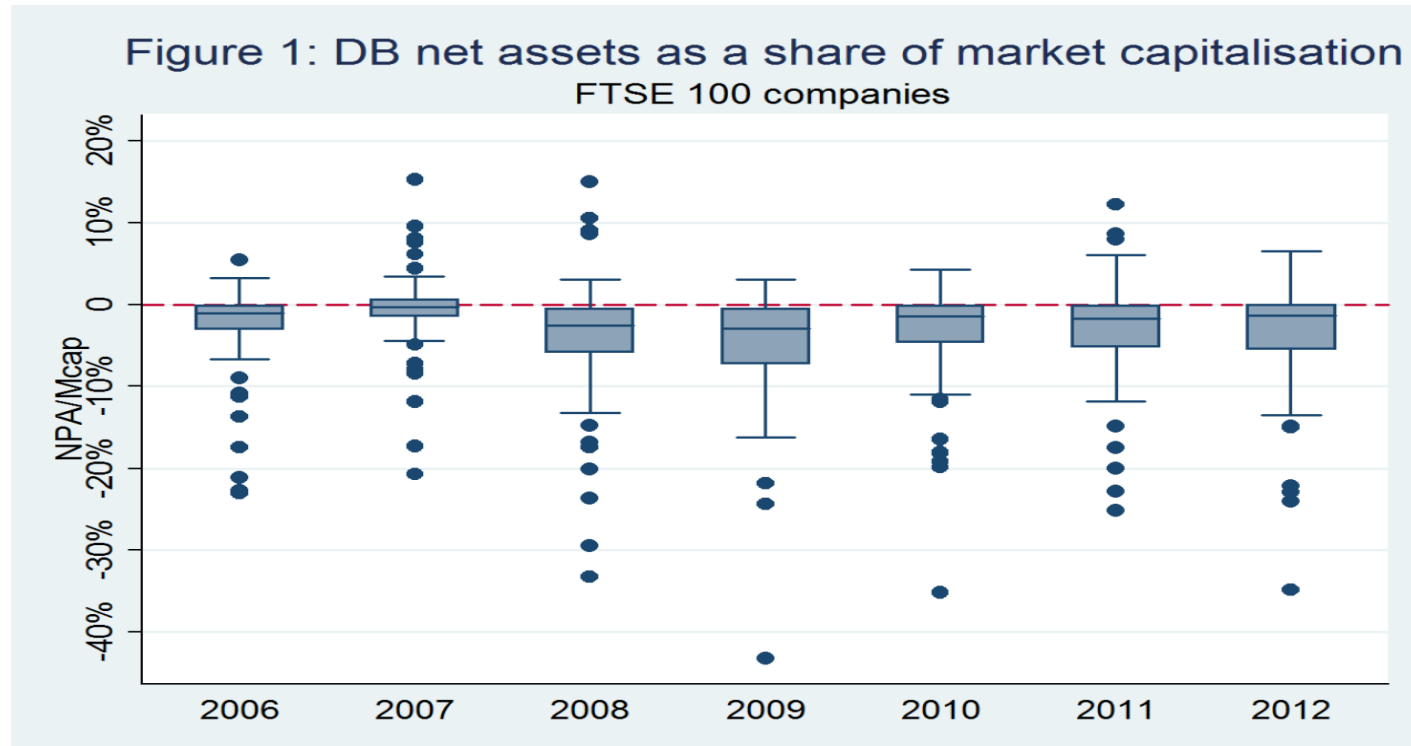


https://www.pensioncorporation.com/sites/default/files/files/Llewellyn_report_brochure_final_visual_small.pdf

Scope of the presentation

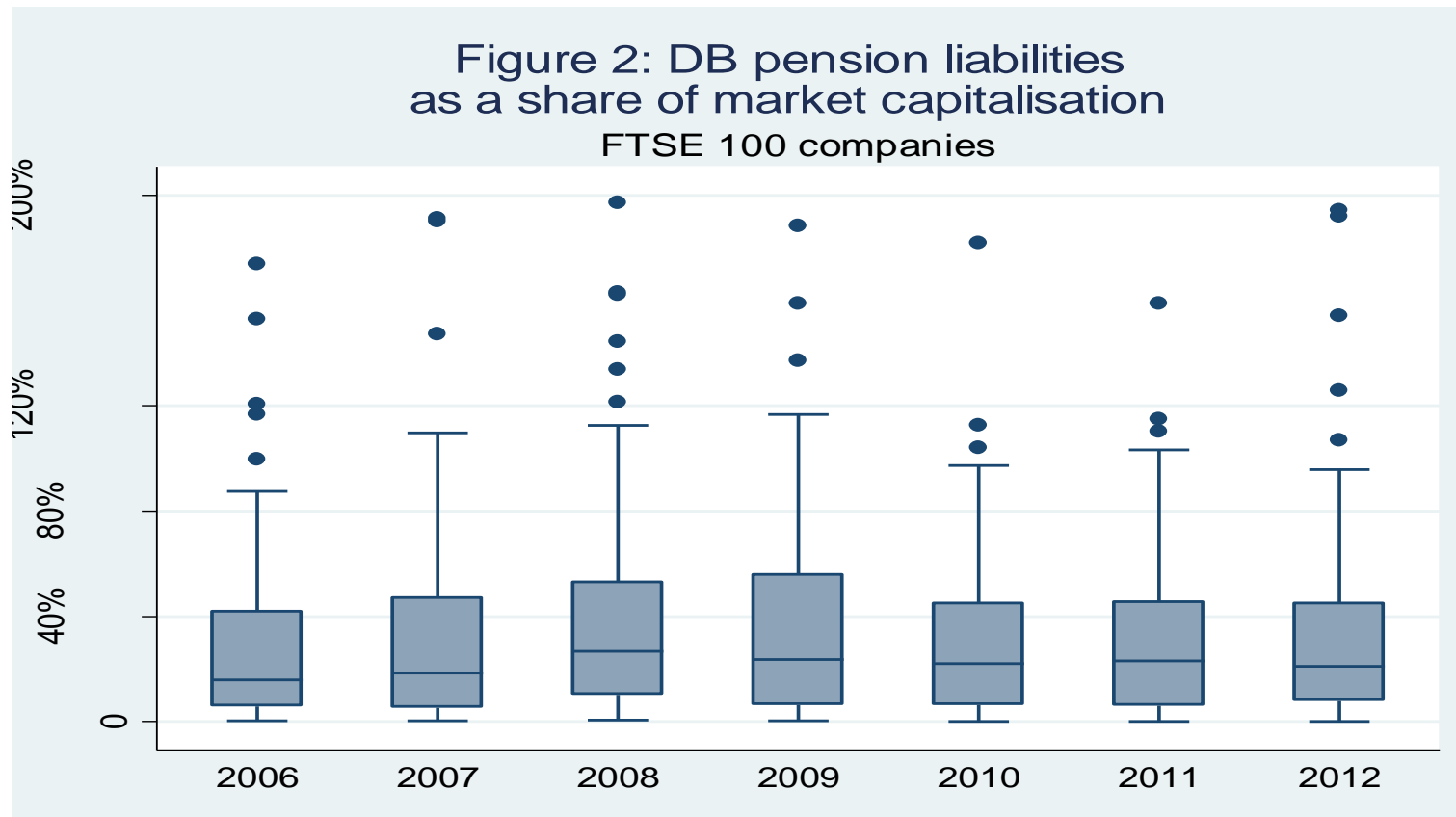
- Background and motivation for the study
- The basic approach and economic framework
- Initial statistical results and related inferences
- Extending the basic model and results to examine specific factors
 - Measurement issues and risk premia
 - Measurement issues and “fair valuation” of pension obligations
- Overall findings and conclusions
- Current work extending the study and preliminary conclusions
- Thoughts on further extensions to the work

Background and motivation for the study: DB deficits



- Although defined benefit (DB) pension schemes have been progressively modified and closed to new entrants over the past decade, DB liabilities and net assets remain a large and potentially volatile component of the sponsor company finances.
- For the FTSE 100 companies, DB net deficits averaged 5% of market capitalisations (2012) with large variations across companies – net deficits well in excess of 10% of market valuations in some cases.
- Also large fluctuations over time.

Background and motivation: Similar pattern for DB liabilities



- For the FTSE100 companies, the underlying pension benefit obligations averaged almost 50% of market capitalisation (2012), also with large variations across companies – in excess of 100% for those with the largest schemes.
- With large fluctuations over time, during the recession, but remain substantial in recent years.

Background and motivation for the study

- The inherent uncertainty has led to a variety of de-risking products becoming available ranging from instruments and insurances to hedge specific risks , to insurance buy-ins of specified liabilities and partial or outright buy-outs.
- There have nonetheless been few studies of the significance of DB pension deficits and related risks on company valuations and share prices.
- Some individual case studies do exist but nothing systematic across companies
- The present study seeks to redress this balance looking specifically at DB pension schemes for the FTSE 100 companies over the period 2006-2012.

Establishing the effects of DB schemes on company valuations

- It seems reasonable to suppose that, when a company asset or liability is taken off (or added to) its books, it will be reflected, more or less one-for-one, in the company's valuation
- A number of studies, notably those by US Fed researchers (Coronado and Sharpe, in 2003 and 2006) do not find any such effect, and suggest that for US companies the pension “footnotes” are worthless
- Even so UK accounting standards differ considerably from those of the US and reporting requirements have improved over time, resulting in more and better detail

The basic approach

The basic approach was data-based, and used an econometric model

- We first compiled a large data base taken from the published company accounts for the FTSE100, the associated pension notes for the period 2006 to 2012 (7 years)
- We then estimated an econometric model using panel data methods, relating market values to:
 - book values of companies excluding pensions (BVC)
 - Company pension and non-pension earnings (E and NPPC)
 - Net DB pension assets, as reported in the notes to the annual company accounts (NPA)
- Typically we estimate equations of the form:
 - $MCAPA = f(BVCA, EA, NPAA, NPPCA, \text{fixed factor effects})$,where A indicates variables are measured as the ratio to total assets

Initial estimates: Table 1: Simple valuation model for MCAPA using the published data set (sample 2006-2012)

- Results confirm a reasonably well determined model
- a strong and significant statistical correlation between market valuations and:
 - Company earnings and the non-pension book value of company net assets
 - the initial estimated coefficients for pension net assets (NPAA), are highly significant at around 1.6 (filtered sample)
- Implying that a £100 net pension deficit (or surplus) is valued by the market at around £160

Sample/equation notes	Net asset model Full sample N=581	Net asset model 'fair value' sample N=543
BVCA	0.8796*** (.22)	0.4644** (.15)
EA	5.0030*** (1.01)	3.6975** (.80)
NPAA	2.0347*** (.51)	1.5990** (.49)
PLA	-	-
NPPCA	3.6317 (6.68)	5.9406 (6.19)
CONSTANT	0.4213** (.16)	-0.0048 (.14)
R2	.5266	0.5819
Root mean sq error	.6187	0.4799

- **This seems implausibly high**

MCAPA = Market value of company/Total Assets
BVCA = Book Value of Company (ex Pensions)/ Total Assets
EA = Company (non-pensions) Earnings/Total Assets
NPAA = Net DB Pension Assets /Total Assets
PLA = Pension Liabilities/Total Assets
NPPCA = Net Periodic DB Pension Costs/Total Assets
Coefficient significance levels are indicated * p<.05 ** p<.01 *** p<.001 (90%, 98% and 99.8% levels)

Next stage: Separating pension liabilities and assets

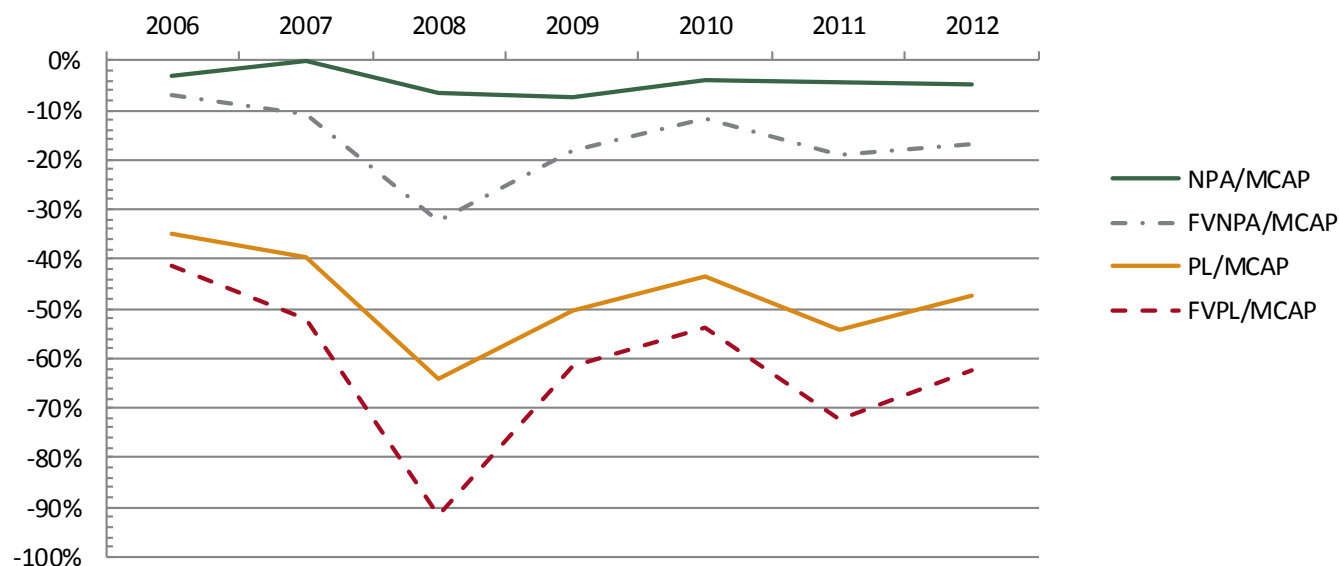
- We next separate the estimated effects coming pension assets and liabilities
- These are equally statistically significant and an improvement
- The key result : the market appears to attach a higher weight to **liabilities**
- Specifically those estimates implied an impact of:
 - £85 per £100 of deficit; plus
 - An additional £18 per £100 of liabilities
- This is equivalent to a rule of thumb of an average risk premium of around 20% on reported liabilities

Equation	1.5	1.6
Sample/equation notes	Net asset model 'fair value' sample N=543	Eq. 1.5 with liability term 'fair value' sample N=543
BVCA	0.4644** (.15)	0.4377** (.15)
EA	3.6975** (.80)	3.7924*** (.81)
NPAA	1.5990** (.49)	0.8469* (.54)
PLA		0.1765* (.08)
NPPCA	5.9406 (6.19)	3.2990 (6.53)
CONSTANT	-0.0048 (.14)	0.0232 (.14)
R2	0.5819	.5862
RMSE	0.4709	0.4779

Investigating possible sources of bias in valuing DB liabilities

- Free choice corporate rates to discount pension liabilities leads to arbitrary differences across companies.
- Instead we chose to standardise across companies
- by deriving approximate liability duration,s then using standardised (gilt) rates to produce 'fair-value' estimates
- Standardising liability estimates across companies changes values importantly

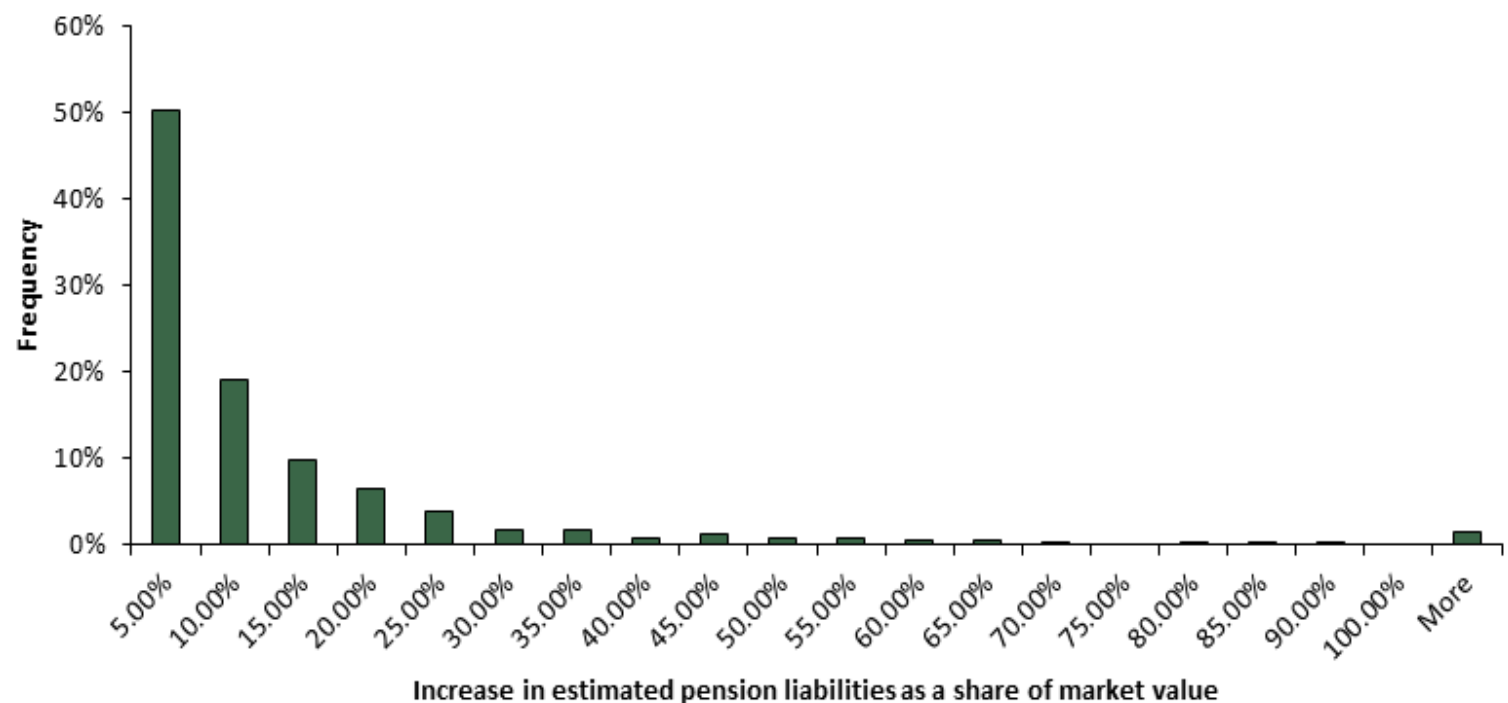
Figure 3: The effects of 'fair-value' adjustments on pension net assets and liabilities as a percentage of market value



The distribution of the ‘fair-value’ adjustments

... is skewed across companies

Figure 4: The impact of ‘fair-value’ adjustments on pension liabilities as a percent of market value



Source: The DB Pensions Analytic Data Base

Notes: Figure 4 reports the frequency distribution of percentage revisions to pension liabilities as a share of market value of the company due to fair valuation adjustments.

The model was then re-estimated, using 'fair-value' estimates

This gave the most (statistically) satisfactory and stable models

Equation	2.1	2.2	2.3	2.4	2.5	2.6
Sample/equation notes	Net asset model FV sample N=543	Eq.2.1 with liabilities term N=543	FV Net asset model N=543	Eq.2.3 with liabilities term N=543	Eq.2.3 with valuation test N=543	Eq.2.3 with total earnings Term N=543
BVCA	0.4644*** (.15)	0.4377*** (.15)	0.4310** (.15)	0.4376** (.15)	0.4295*** (.15)	0.4296** (.15)
EA	3.6975*** (.80)	3.7923*** (.81)	3.7853*** (.80)	3.7647*** (.80)	3.7872*** (.80)	
E						3.7692*** (.80)
NPAA	1.5990*** (.49)	0.8469* (.54)				
FVNPAA			0.9276*** (0.22)	1.1742** (.47)	0.9457*** (.29)	0.9054*** (.19)
FVdiff					-0.0596 (.47)	
PLA		0.1765* (.08)				
FVPLA				-0.0690 (.43)		
NPPCA	5.9406 (6.19)	3.2991 (6.52)	2.5567 (6.27)	2.6723 (6.39)	2.5894 (6.3)	
CON	-0.0048 (.14)	0.0232	0.0027 (.14)	-0.0043 (.14)	0.0002 (.14)	0.0225 (.10)
R2	0.5819	0.5862	0.5897	0.5899	0.5897	0.5896
RMSE	.4799	0.4779	0.4754	.4758	0.4759	0.4750

Fair value model:

This gave the most (statistically) satisfactory and stable models

- For the sample the average correction to liabilities is of the order of 20%, but varies considerably across time and company (as shown in Figure 4)
- The parameter of the corrected deficit is highly statistically significant, stable, and close to unity imply an effect of £93 per £100 of corrected deficit
- Companies with the largest DB pension schemes seem to be penalised most heavily by the markets, even where a pension scheme is reported to be fully funded
- The results are also found to be reasonably robust to the exclusion of companies with the largest pension deficits

Fair value model: Robustness

The results are also found to be reasonably robust to the exclusion of companies with the largest pension deficits

Equation	3.1	3.2	3.3	3.4
Sample/ equation notes	Full sample N=543	Excluding R>3 N=532	Excluding R>2 N=500	Excluding R>1 N=486
BVCA	0.4310** (.15)	0.4136** (.15)	0.4225** (.15)	0.4080** (.15)
EA	3.7853*** (0.80)	3.7256*** (0.80)	3.6554*** (0.80)	3.6311 (0.80)
FVNPAA	0.9276*** (0.22)	0.8965*** (0.23)	0.9199** (0.37)	0.8356** (0.38)
NPPCA	2.5567 (6.27)	0.8633 (6.51)	0.0111 (7.7)	-0.8326 (7.81)
CONstant	0.0027 (.14)	0.8295*** (.11)	0.8667*** (.12)	0.8645 (.12)
R2	0.5897	.5901	.5892	0.5828
RMSE	0.4754	.4760	.4845	0.4897

$R = -PL/MCAP$ = Ratio of DB Pension Liabilities to market capitalisation

Further analysis supported these basic findings

... while raising further considerations

- Experimentation with alternative company-risk (equity and liability) variables tended to support all the above conclusions, but did not improve on the 'fair-value correction' results
- Assessing the overall impact of pension deficits suggests that it is both company- and time-dependent:
 - The quoted 20% valuation adjustment is an average across companies across time
 - The 'adjustment' was larger during the financial collapse, given the profile of gilts vis-à-vis corporate bonds; and it will vary with company-specific durations and choices of corporate bond rate
 - Note also the spread of overall 'fair-value' adjustments (figure 4)
 - 5% for 50% of companies;
 - 10% for 20% of companies;
 - 15-25% for 20% of companies; and
 - A long flat tail of companies with much larger adjustments]

The study's main findings

... in respect of the FTSE 100 companies for the period 2006 to 2012

- The valuation of UK companies apparently does reflect the value of their DB pension net liabilities, and more or less one-for-one provided that these liabilities are properly valued, and on a systematic basis
- Companies with large DB liabilities appear to be further penalised
 - This reflects their potential vulnerability to economic risks, and possible miss-valuation given typically larger liabilities. **In this sense, size really does matter**
- Nonetheless there is considerable scope for further analysis and investigation.

More recent extensions to the study

Current ongoing work is focussing on:

- **Extending the study over a longer period to include the most recent accounts (to 2013)**

How robust are the original results and do they generalise over a longer period?
- **Extending the range of deficit impact estimates for the FTSE 100 companies**
 - a. What was the profile of DB pension effects on the average FTSE index over time? How large were they through the recession and to what extent have they attenuated since?
 - b. How do the estimated impacts vary across companies and company groupings - by size, sector, and pension characteristics?
- **Exploring the impact of recent accounting reforms on pension deficits and company valuations**
 - a. New regulations require companies to disclose duration assumptions (previously estimated)
 - b. New regulations require companies to use the discount rate used for liabilities as rate of return on pension assets. This might lower reported earnings and increase deficits (impacts on share prices?)

Thoughts on further work

1. Extending the study beyond the FTSE100

- a. Does a larger sample including FTSE 250/350 companies support or undermine the existing results, and why?
- b. Do the FTSE 100 companies attract greater market attention?
- c. To what extent does the quality of pension-note information diminish going from the FTSE 100 to FTSE 250 and FTSE 350 companies?

2. Exploring the implications for other countries

- a. Revisit the original US studies, given more recent changes in accounting standards
- b. Extending the scope to other countries for which DB pensions are still a significant part of the company balance sheet (other major European countries).

Both areas would imply major additional data requirements