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**The Corporate Governance of Defined Benefit Pension Plans:  
 Evidence from the United Kingdom**

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**Introduction**

- Corporate Defined Benefit (DB) pension plans:
  - Still very common among large UK and US companies.
  - Often under-funded: liability for sponsoring companies.
  - FTSE 100 companies, at the end of 2003:
    - Pension plan assets = £233 billion.
    - Pension plan deficit = £51 billion.
- Who manages them?
  - Trustees.
  - Who are they?
    - Employees, independent individuals, but often executive directors of sponsoring company.
  - For the latter group, is there a conflict of interest between their executive and trustee roles?

  
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**Introduction**

- How does the presence of insider-trustees (i.e. trustees who are also executive directors of the sponsoring company) affect the decisions taken within the pension plan?
  - How the assets of the pension fund are invested.
  - The firm contributions paid into the fund.
- Underlying hypothesis: the presence of insider-trustees allows the coordination of decisions taken within the pension plan and sponsoring company.

  
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## Introduction

- The presence of insider-trustees may:
  - lead to **agency problems** (particularly when the firm is highly leveraged):
    - **Risk shifting**: Pension plan liabilities like long-term debt. Insider-trustees acting in the interest of shareholders tilt pension investment towards equities, and make lower contributions.
  - facilitate **tax arbitrage**: a tax-paying company with a DB plan should increase leverage, use the proceeds to fund the pension plan, and invest them in bonds.
    - Risk profile will not change.
    - Increase in leverage generates a debt tax shield.
    - Return on bonds held in the pension plan is tax-exempt.

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## Introduction

- We use UK data on DB corporate pension plans to test these alternative hypothesis.
- We find evidence that supports the agency hypothesis:
  - In more leveraged firms, a higher proportion of insider trustees lead to a higher fraction of the pension plan assets being invested in equities, and to lower firm contributions into the pension plan.
  - This evidence is robust to an IV approach that treats the fraction of insider-trustees as an endogenous variable.
- We find no evidence in favour of the tax-arbitrage hypothesis.

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## Outline of the Talk

- Introduction ✓
- UK DB Corporate Pension Plans
- Hypotheses
- The Data
- Results
- Further Evidence
- Conclusion

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## UK Corporate Pension Plans

- UK DB corporate pension plans are setup as trusts:
  - To gain tax advantage.
  - To keep the assets of the pension plan separate from the assets of the sponsoring company.
- These trusts are administered by trustees who:
  - Decide on strategic asset allocation of the pension plan assets:
    - Share invested in equities, bonds, cash.
    - Trustees are not allowed to invest more than 5% of the plan's assets in employer-related investments.

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## UK Corporate Pension Plans

- The trusts are administered by trustees who:
  - Decide on the level and timing of firm contributions into the pension plan.
    - These should be agreed with the sponsoring firm, but if no agreement trustees should put a schedule in place anyway.
    - Minimum funding requirements specify horizon (10 years) in which shortfall in pension plans should be eliminated, but other than that no explicit rules regarding firm contributions.
    - Trustees and sponsoring firms may apply for an extension to these horizons to the regulatory authority (OPRA).

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## UK Corporate Pension Plans

- Some quotes from the regulatory agency on the duties of trustees:
  - "It is a trustee's duty to make sure that the scheme's money is invested prudently, the scheme is administered properly, and that members' benefits are secure."
  - "It is **not** your role to represent the interests of any particular group or individual, such as the **employer**, **pensioner members** or a **trade union**. Separate issues such as the cash-flow needs of the employer or negotiations about pension benefits between the employer and workforce representatives are **not** your business."

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## UK Corporate Pension Plans

- But who are the trustees?
  - At least one third must be member-nominated. Remaining nominated by sponsoring firm.
  - Among those nominated by the sponsoring firm there are:
    - Employees;
    - Independent individuals;
    - Directors of the sponsoring company.
- We use the fraction of pension plan trustees who are executive directors of the sponsoring company (the insider ratio) as a measure of control that the firm may exert over the pension plan.

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## Hypotheses

- Agency predictions: Leveraged firms with a higher insider ratio:
  - Invest a larger fraction of pension assets in equities.
  - Make lower contributions to the pension plan.
  - References: Treynor, 1977, Besley and Prat, 2003, Webb, 2004.
- Tax arbitrage predictions: Tax-paying firms with a high insider ratio:
  - Invest a larger fraction of pension assets in bonds.
  - Make larger contributions to the pension plan.
  - References: Black, 1980, Tepper, 1981, Bodie et al., 1987, Frank, 2002.

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## Hypotheses

- Other hypotheses:
  - Rauh (2004): finds in a sample of US firms that mandatory contributions into DB pension plans force financially constrained firms to reduce investment.
  - Does the presence of insider-trustees allow firms to make lower contributions into the pension plan at times when the firm needs the resources for investment?

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## The Data

- From the footnotes to the annual reports of Footsie 350 companies hand-collected data on:
  - Whether companies sponsor a DB pension plan (203 companies have a DB pension plan).
  - Market value of the pension plan assets, and how they are invested (equities, bonds, other).
  - Present value of the pension plan liabilities, and actuarial assumptions used for the valuation.
- From the publication "Pension Funds and Their Advisers" hand-collected data on:
  - Names of pension plan trustees: only available for 90 out of the 203 firms, or 44%. (Need to investigate possible sample selection bias.)
  - Number of pension plan members.

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## The Data

- From Datastream:
  - Other sponsoring firm data: value of firm assets, leverage, number of employees, profitability, taxes paid, investment.
  - Measure of corporate governance at the sponsoring firm level:
    - Fraction of independent directors on the sponsoring company's board of directors.
    - The correlation between CEO turnover and bad performance is greater in companies with more independent directors (Weisbach, 1988).
- Trustees names are cross-checked against annual reports to check whether they are directors of the sponsoring company.

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## The Data: Variables.

Insider ratio = Fraction of pension trustees who are executive directors in the sponsoring company.  
Pension surplus = (Pension assets 2002 – Pension liabilities 2002) / Pension Liabilities 2002.  
Pension surplus over firm assets = (Pension assets 2002 – Pension liabilities 2002) / Book value of firm assets 2002.  
Share invested in equities = Investment in equity 2003 / Pension plan assets 2003.  
Contributions over firm assets = Contributions into pension plan in 2003 / Book value of firm assets at the end of 2002.  
(Other variables defined in the appendix)

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**Table 1: Summary statistics.**

Variable	Mean	Median	Sd. deviation	25 <sup>th</sup> percentile	75 <sup>th</sup> percentile	Number of observations
Pension plan assets (£ billion)	1.392	0.219	0.055	0.770	3.842	90
Pension plan liabilities (£ billion)	1.530	0.289	0.082	0.764	4.073	90
Pension plan surplus	-0.211	-0.256	0.680	-0.320	-0.087	90
Pension surplus over firm assets	-0.040	-0.031	0.061	-0.067	-0.003	90
Number of pension members	22,139	7,629	51,037	1,823	16,004	80
Share invested in equity	0.667	0.690	0.146	0.597	0.764	90
Contribution over firm assets	0.008	0.005	0.008	0.002	0.013	90
Number of trustees	6	6	2	5	8	90
Insider ratio	0.252	0.250	0.206	0.000	0.400	90
Fraction of independent directors	0.514	0.500	0.104	0.273	0.750	90
Number of firm employees	24,699	9,301	48,096	3,998	24,267	90

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**Table 2: Pair-wise correlations.**

	Pension surplus over firm assets	Log (Number of pension members)	Share invested in equity	Contrib. over firm assets	Number of trustees	Insider ratio	Fraction of independent directors	Profitability
Log (Number of pension members)	0.071 (0.531)							
Share invested in equity	<b>-0.229</b> (0.037)	-0.174 (0.124)						
Contribution over firm assets	<b>-0.526</b> (0.000)	0.151 (0.181)	-0.082 (0.443)					
Number of trustees	-0.024 (0.820)	<b>0.532</b> (0.000)	-0.151 (0.155)	0.112 (0.297)				
Insider ratio	0.126 (0.237)	<b>-0.347</b> (0.002)	0.065 (0.546)	-0.143 (0.178)	<b>-0.311</b> (0.003)			
Fraction of independent directors	0.175 (0.121)	-0.019 (0.869)	<b>-0.258</b> (0.021)	-0.082 (0.472)	0.050 (0.662)	<b>-0.230</b> (0.040)		
Profitability	-0.155 (0.151)	-0.160 (0.161)	0.055 (0.615)	<b>0.262</b> (0.014)	<b>-0.189</b> (0.079)	-0.015 (0.888)	-0.065 (0.569)	
Book leverage	<b>0.190</b> (0.073)	0.040 (0.723)	-0.030 (0.778)	<b>-0.222</b> (0.036)	<b>0.183</b> (0.085)	-0.069 (0.516)	0.130 (0.251)	-0.136 (0.208)

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**The Data: Sample Selection Bias.**

- Sample selection bias concerns:
  - Names of trustees are disclosed on a voluntary basis.
  - Compare companies with and without names of the trustees.

**100** = FTSE 100 companies at the end of 2003.

**93** = # Companies with DB pension plan [from annual reports].

**84** = # Companies included in the publication "Pension Funds and Their Advisers". [only small DB plans are excluded].

**42** = # Companies with names of trustees.

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**Table 3:  
Selection  
bias.**

Variable	Sample with trustee information	Sample without trustees information	Test of equality of means and medians Means: p-value [Medians: p-value]
	Mean [Median] (Std. deviation)	Mean [Median] (Std. deviation)	
Number of observations	42	42	
Book value of firm assets (£ billion)	43.205 [6.841] (100.339)	48.322 [8.522] (115.475)	0.831 (0.663)
Profitability	0.056 [0.063] (0.120)	0.061 [0.058] (0.079)	0.818 (0.912)
Number of firm employees	48,449 [29,000] (65,361)	53,376 [38,051] (55,561)	0.714 (0.269)
Book leverage	0.301 [0.289] (0.173)	0.299 [0.261] (0.136)	0.414 (0.582)
Pension plan assets (£ billion)	3.297 [1.184] (5.547)	2.166 [1.650] (2.850)	0.243 (0.663)
Pension plan liabilities (£ billion)	4.067 [1.513] (6.730)	2.667 [1.266] (3.447)	0.235 (0.443)
Pension plan surplus	-0.207 [-0.226] (0.130)	-0.208 [-0.223] (0.112)	0.928 (0.912)
Pension surplus over firm assets	-0.047 [-0.035] (0.060)	-0.044 [-0.023] (0.055)	0.772 (0.322)
Share invested in equity	0.703 [0.730] (0.145)	0.669 [0.692] (0.185)	0.349 (0.443)
Contribution over firm assets	0.006 [0.004] (0.006)	0.006 [0.003] (0.006)	0.717 (0.238)
Fraction of independent directors	0.547 [0.536] (0.112)	0.532 [0.546] (0.121)	0.543 (0.662)

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Vol. 67, No. 1, pp. 1-17, 2012

## Regression Analysis

### Regression Analysis:

$$\alpha_i^{Equities} = \beta_1 * Insider\ ratio_i + \beta_2 * Leverage_i + \beta_3 * Insider\ ratio_i * Leverage_i + \gamma * Pension\ surplus\ over\ firm\ assets_i + \varepsilon_i$$

$$Contributions\ over\ firm\ assets_i = \beta_1 * Insider\ ratio_i + \beta_2 * Leverage_i + \beta_3 * Insider\ ratio_i * Leverage_i + \gamma * Pension\ surplus\ over\ firm\ assets_i + \varepsilon_i$$

- Instrumental variables for insider ratio: log number of pension plan members, number of trustees, and fraction of independent directors of sponsoring company.

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**Table 4: Investment in Equities**

	(1)	(2)	(3)	(4)	(5)
Insider ratio	0.074 (0.447)	0.076 (0.442)	-0.129 (0.489)	-0.125 (0.502)	0.136 (0.278)
Book leverage		0.020 (0.847)	-0.189 (0.226)	-0.162 (0.277)	
Insider ratio * Book leverage			<b>0.800</b> <b>(0.074)</b>	<b>0.807</b> <b>(0.076)</b>	
Average tax rate				0.731 (0.261)	1.235 (0.384)
Insider ratio * Average tax rate					-2.451 (0.545)
Pension surplus over firm assets	<b>-0.619</b> <b>(0.025)</b>	<b>-0.631</b> <b>(0.039)</b>	<b>-0.614</b> <b>(0.049)</b>	-0.552 (0.105)	<b>-0.571</b> <b>(0.069)</b>
Constant	0.631 (0.000)	0.625 (0.000)	0.681 (0.000)	0.656 (0.000)	0.601 (0.000)
R <sup>2</sup>	0.057	0.058	0.085	0.095	0.069
Number of obs.	90	90	90	90	90

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**Table 5: Pension plan contributions.**

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	IV	IV	IV
Insider ratio	-0.003 (0.423)	-0.002 (0.774)	-0.003 (0.561)	-0.014 (0.106)	0.015 (0.435)	<b>-0.024</b> <b>(0.077)</b>
Book leverage		-0.005 (0.576)			0.018 (0.256)	
Insider ratio * Book leverage		-0.005 (0.808)			<b>-0.088</b> <b>(0.076)</b>	
Average tax rate			0.046 (0.348)			0.027 (0.715)
Insider ratio * Average tax rate			0.008 (0.962)			0.250 (0.383)
Pension surplus over firm assets	<b>-0.069</b> <b>(0.000)</b>	<b>-0.065</b> <b>(0.000)</b>	<b>-0.064</b> <b>(0.000)</b>	<b>-0.058</b> <b>(0.000)</b>	<b>-0.060</b> <b>(0.000)</b>	<b>-0.049</b> <b>(0.001)</b>
Constant	0.006 (0.000)	0.008 (0.005)	0.005 (0.008)	0.009 (0.000)	0.003 (0.664)	0.010 (0.033)
Number of obs.	90	90	90	80	80	80

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**Table 6: Investment in equities: IV.**

	(1)	(2)	(3)	(4)	(5)
Insider ratio	<b>0.481</b> <b>(0.017)</b>	<b>0.506</b> <b>(0.018)</b>	-0.272 (0.616)	-0.360 (0.531)	<b>0.644</b> <b>(0.043)</b>
Book leverage		0.107 (0.336)	-0.530 (0.205)	-0.561 (0.203)	
Insider ratio * Book leverage			<b>2.254</b> <b>(0.068)</b>	<b>2.452</b> <b>(0.059)</b>	
Average tax rate			0.962 (0.279)	2.268 (0.378)	
Insider ratio * Average tax rate					-6.286 (0.522)
Pension surplus over firm assets	<b>-0.825</b> <b>(0.008)</b>	<b>-0.884</b> <b>(0.011)</b>	<b>-0.726</b> <b>(0.086)</b>	-0.642 (0.164)	<b>-0.788</b> <b>(0.017)</b>
Constant	0.522 (0.000)	0.486 (0.000)	0.716 (0.000)	0.713 (0.001)	0.464 (0.000)
Number of obs.	80	80	80	80	80

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**Further Evidence**

- Further prediction of the agency hypothesis: lower pension plan contributions should be accompanied by higher dividend payouts to shareholders (Webb, 2004).
- Is there evidence that insider-trustees allow a better cash-flow management?
  - If external capital is expensive (as e.g. in Myers and Majluf, 1984), a forced payment into the pension plan may have the effect of reducing corporate investment below the optimal level.
- Further regression analysis to investigate these issues.

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**Table 7:  
Alternative  
agency  
hypotheses**

	(1)	(2)	(3)	(4)
Insider ratio	0.002 (0.624)	0.004 (0.494)	0.002 (0.828)	-0.077 (0.028)
Profitability	<b>0.029</b> (0.003)	<b>0.019</b> (0.004)	<b>0.019</b> (0.061)	<b>0.045</b> (0.000)
Dividend payout ratio	0.002 (0.130)			
Insider ratio * Dividend payout ratio	<b>-0.005</b> (0.094)			
Investment		<b>0.063</b> (0.015)		
Insider ratio * Investment		<b>-0.145</b> (0.089)		
Tobin's q			<b>0.002</b> (0.072)	
Insider ratio * Tobin's q			-0.002 (0.706)	
Pension surplus over firm assets	<b>-0.065</b> (0.000)	<b>-0.064</b> (0.000)	<b>-0.066</b> (0.000)	
Pension funding surplus				<b>-0.029</b> (0.042)
Insider ratio * Pension funding surplus				<b>0.185</b> (0.042)
R <sup>2</sup>	0.362	0.355	0.350	0.198
Excluded companies	None	None	None	Those with pension funding surplus > -10%

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### Conclusion

- Pension plans of more leveraged firms with a higher proportion of insider-trustees:
  - Invest a higher proportion of the pension assets into equities.
  - Contribute less into the pension plan.
  - Tend to have a higher dividend payout ratio.
  
- This is consistent with an agency hypothesis, whereby insider trustees act in the interest of shareholders of the sponsoring company, and not necessarily pension plan members.

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### Conclusion

- Caveats:
  - A large proportion of insider-trustees seems to lead to agency problems, but the optimal number of insider-trustees may not be zero.
  - No evidence on value.
  
- Related issue that we plan to address in future research:
  - Do companies treat pension deficits as debt? That is, do pension deficits affect the capital structure of companies?

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