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The Effect of Pension Accounting on Corporate Pension Asset Allocation: A Comparative Study of UK and US

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Abstract

We investigate whether new pension disclosures and subsequent full pension recognition under *FRS* 17 and *IAS* 19 had any impact on pension asset allocation of UK companies. We also compare pension asset allocation of UK companies to that of US companies prior to and during the adoption of *SFAS* 158.

Both *FRS* 17 and *IAS* 19 require pension assets and liabilities to be valued by reference to market conditions and the total surplus/deficit in the pension scheme to be recognized on the balance sheet. Additionally, periodical actuarial gains/losses are required to be recognized immediately in comprehensive income. Therefore, these standards introduce a large element of volatility into company balance sheets and comprehensive income. The requirements in *FRS* 17 and *IAS* 19 are similar to those of *SFAS* 158, which replaced *SFAS* 87 in December 2006.

We identify a *Disclosure* period as the period in which UK companies had to disclose all the required data under *FRS* 17 in the notes to the financial statements without formally recognizing the full pension surplus/deficit on the balance sheet. We also identify a *Full Recognition* period starting one year prior to adoption until one year subsequent to the formal adoption of either *FRS* 17 or *IAS* 19. We hypothesize that there exists a shift of pension assets from equity to debt securities by UK sponsoring companies during the *Disclosure* period of *FRS* 17 due to the higher visibility of pensions in the UK and the anticipation of full recognition. We also predict a decline in pension funds allocated to equity securities during the *Full Recognition* period, around the adoption of *FRS* 17 and *IAS* 19. Similarly, we predict a decline in pension assets allocated to equity securities during the adoption of *SFAS* 158.

We find that UK companies modified their pension asset allocation policies by shifting assets from equity to debt securities during both the *Disclosure* and the *Full Recognition* periods. We also find that prior to the adoption of *SFAS* 158, US companies maintained a stable allocation to equities and bonds. However, there is a shift from equity to debt securities during the *SFAS* 158 *Full Recognition* period. Finally, we find that UK and US firms with relatively larger pension schemes and larger magnitudes of actuarial gains/losses shift more pension assets from equity to debt securities.

Keywords: Defined Benefit Pension Plans, Pension Asset Allocation, Pension Surplus/ Deficit, Actuarial Gains/Losses, *FRS* 17, *IAS* 19, *SFAS* 158.

1. Introduction

The purpose of this study is to investigate the effect of disclosure and subsequent full recognition of pension surplus/deficit on the allocation of pension funds to equity and debt securities. Corporate sponsored pension funds play a significant role in capital markets due to the large size of their investment portfolios. Research by International Financial Services London shows that corporate pension fund assets in the UK amounted to £896 billion as of December 2005, representing more than one quarter of the £3,450 billion assets managed by all types of UK funds (Seib, 2006). Thus, allocation of assets by corporate-sponsored pension funds has received considerable attention in both the academic literature and the popular business press due to potentially large economic transactions that are involved.

This study focuses on defined benefit pension plans. During the last two decades the number of defined benefit plans has been decreasing while at the same time the number of defined contribution plans has been increasing. Still, 47% of pension funds in the United States (about $1.7 trillion) are linked to defined benefit plans. Also, pension asset allocation by defined benefit pension plans has a significant impact on the financial statements of sponsoring corporations because of the key assumptions (e.g., discount rate, expected return on pension assets, etc.) that must be made by corporate managers in the financial reporting process (Amir and Benartzi, 1998; Blake, 2001).

Prior research relates pension asset allocation of US corporations to pension funding levels through tax and other institutional and regulatory settings, such as minimum funding requirements, the tax-deductibility of pension contributions and the existence of the US Pension Benefit Guaranty Corporation (*PBGC*).[1] Pension asset allocation is also related to employee demographics and to firm risk (Friedman, 1983; Bodie et al., 1984). In addition to

[1] See Black (1980), Tepper (1981), Harrison and Sharpe (1983) and Bader (1991). In August 2006, The Pension Reform Act was signed into law in the United States. This Act requires defined benefit pension plans to attain full funding status within seven years by making additional contributions to the plans.

funding levels, demographics and firm risk, Amir and Benartzi (1999) argue that US corporations that sponsor defined benefit pension funds modify their pension asset allocation to avoid recognition of minimum pension liability under Statement of Financial Accounting Standards (*SFAS*) No. 87 (*FASB*, 1985). Specifically, they argue that sponsoring companies that are closer to minimum liability recognition requirements would invest more in bonds to allow better matching between pension assets and liabilities, thus reducing the likelihood of liability recognition. They provide empirical evidence in support of this argument.

In November 2000, the Accounting Standards Board (*ASB*) in the UK issued Financial Reporting Standard (*FRS*) No. 17, Retirement Benefits (*ASB*, 2000), which initially had to be adopted for periods ending after 23 June 2003. In 2002, *ASB* extended the transitional period of *FRS* 17 to fiscal years starting on or after January 1st, 2005, which coincided with the adoption of International Financial Reporting Standards (*IFRS*) in Europe. Effectively, UK companies had to adopt the revised International Accounting Standard (*IAS*) No. 19 (*IASB*, 2004), which was virtually identical to *FRS* 17.[2]

During fiscal years 2001-2005 UK companies were required to provide detailed disclosure on the status of their pension plans. Unlike its predecessor, Statement of Standard Accounting Practice (*SSAP*) No. 24 (*ASC*, 1988), *FRS* 17 requires that pension assets are measured at market value and pension liabilities are discounted using the prevailing market yield on AA-rated corporate bonds. In contrast, under *SSAP* 24 the valuation of both pension assets and liabilities rely primarily on the expected rate of return on assets. Furthermore, *FRS* 17 requires any actuarial gains or losses arising during the year to be recognized immediately in the statement of total recognized gains and losses (comprehensive income), while under *SSAP* 24, actuarial gains/losses are deferred and amortized to income over the average

[2] IAS 19 allows companies to use the 10% Corridor method instead of full pension recognition. Only a handful of UK Companies elected this option and we decided to delete them from our sample.

remaining service lives of employees. Finally, *FRS* 17 requires the total pension surplus/deficit (the difference between the market value of pension assets and the present value of the projected pension liabilities) to be recognized on the balance sheet as an asset or a liability (net of deferred tax). Under *SSAP* 24 such surplus/deficit is kept off balance sheet and disclosure in the notes is required.

FRS 17 is also different from *SFAS* 87 (US GAAP until December 2006) in three major respects. First, under *SFAS* 87, although pension assets are measured at market value, the discount rate in estimating pension liabilities is based on an actuarial basis. Second, under *SFAS* 87 actuarial gains/losses (particularly differences between expected and actual returns on pension assets) are deferred and amortized to income over the average remaining service lives of employees subject to the 10% corridor method. Finally, *SFAS* 87 requires recognition of the pension surplus/deficit on the balance sheet only if a threshold is exceeded (e.g., additional minimum liability). In September 2006, the Financial Accounting Standard Board (*FASB*) issued *SFAS* 158 (*FASB*, 2006) on defined benefit and other postretirement plans. The new standard, which is effective for annual financial statements issued in December 2006, requires immediate recognition of all actuarial gains/losses and prior service cost through other comprehensive income and the full recognition of the pension surplus/deficit, similar to *FRS* 17 and *IAS* 19.[3]

By requiring recognition of net pension surplus/deficit on the balance sheet and the immediate recognition of actuarial gains/losses in comprehensive income, *FRS* 17 introduces material volatility to UK companies' balance sheets, especially if pension assets are mostly invested in equity securities. Firstly, reporting actual, rather than smoothed, pension returns injects volatility into shareholders' equity. Furthermore, the recognized net pension asset/liability could be a significant portion of a company's book value and market

[3] *FRS* 17 still differs from *SFAS* 158 in the estimation of the discount rate.

capitalization. For example, in 2002 Rolls Royce disclosed a *FRS* 17 deficit of £580 million in its pension fund, more than 25% of the assets of the company. The volatility that can therefore be introduced into corporate balance sheets is evidenced by the fact that at the end of 2001 the combined surplus for the FTSE 100 was £5 billion, but by mid July 2002 with the collapse in world stock markets this fell to a deficit of £25 billion (Reynolds, 2002).

Matching pension assets with pension liabilities is the most effective method of reducing the volatility of the pension deficit/surplus and the effect of *FRS* 17 on the volatility of comprehensive income and shareholders' equity. *FRS* 17 requires pension liabilities to be discounted using the prevailing market yield on AA-rated corporate bonds. Consequently, firms can reduce mark-to-market volatility by selecting a portfolio of pension assets whose fair value is positively correlated with the fair value of the pension liability, namely shift pension assets from equity to debt securities.[4] Alternatively, companies could react to the new accounting rules by terminating pension plans (Klumpes and Whittington, 2003) or by converting defined benefit pension plans into defined contribution and cash balance plans (D'Souza et al., 2004).[5] However, these actions may be costly due to tax and labour negotiation costs.

This study investigates the impact of new pension disclosures and subsequent full pension recognition under *FRS* 17 and *IAS* 19 on pension asset allocation of sponsoring companies in the UK. Specifically, we examine changes in UK companies' pension asset

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[4] That is, an increase (decrease) in the yield on AA-rated corporate bonds will decrease (increase) the value of the pension liability. If the pension assets are primarily invested in bonds, the value of the pension assets will similarly decrease (increase) with an increase (decrease) in the yield on AA-rated corporate bonds. In 2001, Boots plc. liquidated all of its equity holdings in its £2.3 billion pension fund and moved the proceeds into long-dated bonds. The sterling bond market received a boost in the week that this news was announced. The Company lists plan maturity, plan size, *FRS* 17, risk reduction and plan management costs as possible reasons for switching to a bond portfolio. Although the company's head of corporate finance rejects the view that *FRS* 17 motivated the switch, he stated that "[T]he Boots *FRS* 17 surplus at 30 September 2001 was £300 pretax. Had we remained at the 30 March 2000 asset allocation, this would have been a £50 million deficit." For additional details see McLeish (2001) and Ralfe (2002).

[5] Swinkels (2006) observes that certain Dutch companies switched from defined benefit pension plans to defined contribution plans following the adoption of *IFRS* standards in 2005.

allocation over the period 2000-2006, during which UK companies had to disclose pension information in the notes to the financial statements and later recognize the full pension surplus/deficit on their balance sheets under either *FRS* 17 (prior to January 2005) or *IAS* 19 (subsequent to January 2005).

We identify two distinct accounting regimes for UK companies: A *Disclosure* period ranging from fiscal 2000 until one year prior to the adoption of *FRS* 17 / *IAS* 19. We also identify a *Full Recognition* regime starting from one year prior to adoption until one year after the adoption of *FRS* 17 / *IAS* 19. We predict that UK companies that sponsor defined benefit pension plans will shift pension assets from equity to debt securities during the *Disclosure* period. This is because of the increased visibility of pension plans due to market-based disclosures and the anticipation of the effect of full pension recognition on the volatility of shareholders' equity and comprehensive income. We also predict a decline in pension assets allocated to equity securities during the *Full Recognition* period due to the recognition of pension surplus/deficit as a liability on the balance sheet and the higher anticipated volatility of shareholders' equity and comprehensive income. Third, we expect the shift to bonds to be more significant in companies with larger relative pension schemes and larger actuarial gains and losses.

A shift from equity to debt securities could occur independently of pension accounting requirements. If pension asset allocation is affected by global capital market changes rather than by new accounting requirements, it is reasonable to expect a similar shift in the asset allocation of US corporate pension funds. Although, there are significant differences between the UK and US equity and debt markets, observing a similar shift in asset allocation for US companies in the absence of accounting changes weakens the argument that changes in accounting requirements are the main cause for the shift. Thus, we identify two pension accounting regimes in the US: a *Partial Recognition* regime starting from fiscal 2000 until

November 2006, and a *Full Recognition* regime starting from one year prior to adoption of *SFAS* 158 until the year of adoption (fiscal 2006). We compare the asset allocation of UK companies to that of US companies and predict that the shift from equity to debt securities will be more pronounced in UK companies than in US companies.

To test our hypotheses, we use pension asset allocation data for large UK companies (FTSE 350) over the period 2000-2006. We also collect similar data for large US firms covered by *Pensions and Investments* over the period 2000-2006. The final sample consists of 1,351 firm-year observations for the UK sample and 1,906 firm-year observations for the US sample.

We find that during the *FRS* 17 *Disclosure* period, UK companies changed their pension asset allocation by shifting funds from equity to debt securities. During the same period, US companies maintained a relatively stable allocation to equities and bonds. This significant difference between UK and US companies supports the argument that new pension disclosures influenced pension asset allocation. We also find that UK companies shifted pension assets from equities to bonds during the *Full Recognition* period. This shift reduces the effect of the new standards on the volatility of shareholders' equity and comprehensive income. Cross sectional tests show that UK companies for which the negative impact of full recognition was expected to be stronger shifted relatively more funds from equity to debt securities. Results based on US companies also indicate a shift away from equities to bonds during the *SFAS* 158 *Full Recognition* period, albeit a smaller shift than documented for UK companies; similar to the UK this shift for US companies is related to the estimated impact of the new pension accounting standard. Collectively, the results corroborate the claim that pension accounting standards have a significant impact on corporate pension asset allocation.

This study contributes to the literature in several ways. It examines the determinants of pension asset allocation within an institutional setting outside the US. In addition, it is

conducted during a period of a pension accounting change in the UK and in the US, which is a powerful setting for testing the main hypothesis in the paper. Furthermore, the empirical evidence in this study is important in understanding the possible effects of full pension recognition accounting on capital markets.

The remainder of this study is organized as follows. Section 2 provides institutional background. Section 3 develops the hypotheses to be tested. Section 4 describes the research design. Sample selection and descriptive statistics are included in Section 5. Section 6 provides the empirical results while Section 7 provides concluding remarks.

2. Institutional Background

SSAP 24, which was used by UK companies for defined benefit pensions since 1988, came under pressure in the late 1990s for its poor disclosure requirements, lack of transparency in the figures it produces, and its inconsistency with US and international standards on pension accounting. *ASB* responded by issuing *FRS* 17, Retirement Benefits, in November 2000.[6] Originally, *FRS* 17 was meant to be adopted by companies with accounting periods ending on or after 23 June 2003. In November 2002, the *ASB* issued an amendment to *FRS* 17 in response to the International Accounting Standard Board's (*IASB*) plan to reconsider the provisions of *IAS* 19. The amendment states that the requirements of *FRS* 17 would become mandatory for accounting periods beginning on or after January 1st, 2005. The purpose of that extension was to allow an orderly transition to revised standards aligned with those of the *IASB* without mandating two changes in accounting for retirement benefits within a period of two years. Consequently, while some UK companies adopted *FRS* 17 prior to 2005 (early adopters), most adopted *IAS* 19, which is very similar to *FRS* 17, except for one important aspect: *IAS* 19 allows companies to use the 10% corridor method.

[6] See Appendix 1 for a list of events pertinent to the introduction of *FRS* 17.

However, only a handful of companies elected this option. During the entire *FRS* 17 transitional period, UK companies had to disclose the present value of the pension obligation, fair value of plan assets, pension asset allocation, estimation parameters and other information in the notes to the financial statements.

FRS 17 differs from *SSAP* 24 in three major aspects. First, *FRS* 17 requires both pension assets and pension liabilities to be valued by reference to current market conditions. Specifically, pension assets should be measured at market value at the balance sheet date and pension liabilities are measured using a discount rate based on the return available on AA corporate bonds at the balance sheet date. Under *SSAP* 24 the valuation of both pension assets and liabilities rely primarily on actuarial assumptions. Second, *FRS* 17 requires any actuarial gains or losses arising during the year to be recognized immediately in the statement of total recognized gains and losses. This implies that under *FRS* 17 actual rather than expected return on pension assets is reflected in shareholders' equity and comprehensive income. Finally, *FRS* 17 requires the total surplus/deficit in the pension scheme to be recognized as an asset or a liability (net of deferred tax) on the balance sheet. Under *SSAP* 24 any pension surplus/deficit was kept off balance sheet.

Until December 2006, accounting for defined benefit plans in the United States was based on *SFAS* 87 (and *SFAS* 106 for other postretirement benefits). *SFAS* 87 requires that pension assets are measured at fair market value and pension liabilities are estimated on an actuarial basis. Also, actuarial gains/losses are deferred and sometimes amortized to the income statement over the average remaining service lives of employees, subject to the 10% corridor method. In addition, *SFAS* 87 requires recognition of the pension surplus/deficit only if a minimum liability threshold is exceeded. In December 2006, *FASB* issued *SFAS* 158, which requires full recognition of pension surplus/deficit on the balance sheet and

recognition of actuarial gains and losses in comprehensive income.[7] Thus, accounting for defined benefits plans in the US as of December 2006 is similar to that of UK companies, namely full pension recognition.[8]

Overall, *FRS* 17 and *IAS* 19 that followed make the effect of defined benefit pension schemes on companies' financial statements more transparent. The standards aim at improving the reporting quality of pension accounting by recognizing the off-balance-sheet funded status of pension plans and by moving from an actuarial basis to a market-based approach in valuation. However, the use of market values at the balance sheet date, the full recognition of a pension surplus/deficit, combined with the immediate recognition of actuarial gains/losses, introduces material volatility into the measurement of pension assets and liabilities and therefore volatility in the sponsoring company's shareholders' equity and comprehensive income.

To examine the effect of *FRS* 17 and *IAS* 19 on pension asset allocation of UK companies, we divide the sample period 2000-2006 into two sub-periods: A *Disclosure* period ranging from fiscal 2000 until one year prior to the adoption of *FRS* 17 / *IAS* 19. For most firms in our sample, this year is fiscal 2004. The second is a *Full Recognition* period ranging from one year prior to adoption of *FRS* 17 / *IAS* 19 until one year subsequent to adoption. For most firms in our sample this period is between fiscals 2004 and 2006. For comparison, we also identify two sub-periods for US companies. However, here the distinction is between partial and full recognition, because *SFAS* 87 contained mechanisms that limited the magnitude of unrecognized pension deficit. Specifically, we define the

[7] The purpose of the 10% corridor method is to prevent accumulation of actuarial gains/losses above 10% of the larger between market value of pension assets and projected benefit obligation. Amortization of actuarial gains/losses is limited only to the portion that exceeds the corridor. The presumption in *SFAS* 87 is that over the long run actuarial gains/losses will revert back to a mean of zero. Minimum liability threshold is the difference between the Accumulated Benefit Obligation (*ABO*) and the market value of pension assets. An additional liability under this requirement is recognized against an intangible pension asset or other comprehensive income.

[8] See Appendix 2 for a comparison of *SSAP* 24, *FRS* 17, *SFAS* 87, *SFAS* 158 and *IAS* 19.

period 2000-2005 as the *Partial Recognition* period and the period 2005-2006 as *Full Recognition* period.[9]

3. Hypotheses Development

Following the issuance of *FRS* 17 in 2000, UK companies were required to disclose the present value of the pension obligation and the market value of pension plan assets, as well as actuarial assumptions and details on asset allocation. These new disclosures meant greater transparency of the pension scheme as well as increasing investor scrutiny of the impact of pension schemes on financial statements. While *FRS* 17 disclosures provide comfort to investors in over-funded plans, under-funded companies are perceived as riskier because pension deficits are a form of debt.[10] Also, the existence of Minimum Funding Requirements increases the likelihood of additional pension contributions, especially in under-funded plans when the economy is not doing well. Higher future pension contributions and the uncertainty associated with their timing and magnitude also increases the perceived risk of sponsoring companies. Furthermore, under *FRS* 17, employees have access to more accurate disclosures on the pension scheme. Thus, disclosing pension deficits could trigger pressure by employees to reduce plan risk, as the employees bear the deficit, while the company enjoys the surplus.

Thus, reporting pension deficits in the notes to the financial statements is costly and companies would prefer to hedge themselves against potential pension deficits by reducing the volatility of the pension surplus/deficit and improving the matching of pension assets and liabilities. Better matching is achieved by allocating more pension assets to debt (i.e., bonds and other interest bearing securities) instead of equity securities. As the market value of

[9] We plan on extending the sample period to include December 2007 data as the post-adoption year.
[10] See Harris et al. (2001) for a discussion of the effects of FRS 17 on financial statements and investors' valuation of sponsoring companies.

bonds is generally less volatile than that of stocks, and since pension liabilities under *FRS* 17 are measured using the prevailing market yield on AA-rated corporate bonds, such a policy would result in lower volatility of the pension deficit/surplus. In addition, a shift from equity to debt securities is likely to be exacerbated by the anticipated adoption of *FRS* 17 and the recognition of the full pension liability on the balance sheet. In contrast, shifting pension assets to bonds is likely to result in higher future pension contributions as the rate of return on bonds is expected to be lower than that on equity securities. Thus, the shift from equity to debt securities will continue as long as the cost of reporting a pension deficit is higher than the present value of additional future contributions.

US companies, on the other hand, have been disclosing market-based pension information in the notes to the financial statements under *SFAS* 87 since 1986. Thus, defined benefit plans have been under investors' and employees' scrutiny prior to fiscal 2000. We, therefore, expect little or no shift from equity to debt securities for US companies during 2000-2005. This analysis leads us to our first research hypothesis:

Hypothesis 1: UK companies that sponsor defined benefit pension plans will shift pension assets from equity to debt securities during the FRS 17 Disclosure period. During the same period, any shift by UK companies will exceed any shift by US companies that sponsor defined benefit pension plans.

Adoption of *FRS* 17, or its equivalent standard, *IAS* 19, meant recognition of the entire pension deficit/surplus on the balance sheet, recognition of all prior service costs in net income and recognition of all actuarial gains/losses in comprehensive income. Therefore, in addition to increasing, on average, the amount of debt on the balance sheet, adoption of the new standards was expected to increase the volatility of shareholders' equity and

comprehensive income.

There are several contractual consequences to the adoption of full pension recognition. First, as many contracts are based on verifiable balance sheet figures, higher recognized debt on the balance sheet increases the likelihood of violating existing debt covenants, hence the cost of debt renegotiation. Second, higher volatility of shareholders' equity increases the probability of violating equity-based debt covenant because the balance sheet is now exposed to market volatility through interest rate changes and changes in market values of equities. Third, the recognition of any pension deficit would be set off against the company's distribution reserves. Therefore, the adoption of *FRS* 17 may decrease distributable reserves and may have a negative effect on the company's ability to pay dividends or to maintain a stable stream of dividends. Adoption could also have a negative effect on stakeholders' ability to evaluate management performance. For example, Return on Equity (*ROE*), a widely used management performance measure, may be distorted as shareholders' equity becomes more volatile. If stakeholders' consider comprehensive income in the numerator of *ROE*, then the volatility of *ROE* is even higher. Also, higher volatility of shareholders' equity and comprehensive income could create a perception of weaker management control. To mitigate the effect of adoption on existing contracts and to facilitate better performance evaluation, we expect managers of UK companies that sponsor defined benefit pension schemes to shift pension assets from equity to debt securities during the adoption of full pension recognition.

Following the adoption of *SFAS* 158, US companies are also expected to shift pension assets from equity to debt securities to reduce the effect of the new standard on total debt and the volatility of shareholders' equity and comprehensive income. However, the effect of adopting *SFAS* 158 in the US is not expected to be as dramatic as that of adopting *FRS* 17 / *IAS* 19 in the UK. This is because prior to adoption, US companies had to recognize part of

the pension liability due to the *SFAS* 87 minimum pension liability requirement. Our second hypothesis is thus:

Hypothesis 2: UK companies that sponsor defined benefit pension plans will shift pension assets from equity to debt securities during the Full Recognition period (adoption of FRS 17 or IAS 19). The shift of UK companies during the Full Recognition period will exceed any shift by US companies during the SFAS 158 Full Recognition period.

Next, we consider the cross-sectional variation in the impact of new pension disclosures and full pension recognition on UK companies. For a company with a large pension scheme, the effect of a change in the market value of pension assets could be significant. For example, in its annual report for fiscal 2003, Charter Plc, a UK-based engineering company, reported pension assets with a market value of £462.2 million, while its shareholders' equity amounted to £24.9 million. This means that a decline of 5.4% in the market value of pension assets could eliminate the company's entire distributable reserves on the balance sheet restricting its dividend payout ability. Similarly, a decline in the yield on the AA-rated corporate bonds could eliminate shareholders' equity, as the pension obligation increases when the discount rate declines. Thus, we expect UK companies with larger pension schemes relative to shareholders equity to shift more assets from equity to debt securities during the *Disclosure* and *Full Recognition* periods.

Companies with larger pension schemes also experience larger actuarial gains/losses, especially if a majority of pension assets are invested in equity securities. These companies are more sensitive to the volatility effects of *FRS* 17 and would therefore have stronger motivation to shift pension assets from equity to debt securities. In contrast, companies with smaller actuarial gains/losses would have a weaker motivation to switch pension funds to

debt securities, since shifting to less risky assets also implies a lower expected return on pension assets on the income statement (Fernandez, 2002). Therefore, we expect the shift from equity to debt securities during both the *Disclosure* and *Full Recognition* periods to be more significant for UK companies with a larger ratio of actuarial gains/losses to shareholders' equity.

Consequently, we hypothesize that the shift from equity to debt securities will be more significant for UK companies with a larger ratio of pension assets/liabilities to shareholders' equity and larger actuarial gains/losses relative to shareholders' equity. As for US companies, we have no priori reason to expect these relations during the *Partial Recognition* period. However, we expect these relations to exist in US companies during the *Full Recognition* period. However, we also expect these relations to be stronger for UK companies than for US companies.

Hypothesis 3a: The shift of pension assets from equity to debt securities by UK companies during the Disclosure period is positively correlated with the relative size of the pension scheme and the magnitude of actuarial gains/losses. This relation is not expected for US companies during the Partial Recognition period.

Hypothesis 3b: The shift of pension assets from equity to debt securities in UK companies during the Full Recognition period is positively correlated with the relative size of the pension scheme and the magnitude of actuarial gains/losses. This relation is expected to be stronger for UK companies than for US companies during the Full Recognition period.

4. Empirical Design

Although pension assets could be invested in a variety of asset categories, disclosures in

financial statements usually classify pension assets into three main categories: 'stocks', 'bonds', and 'others'. Stocks and bonds together account for about 90% of total pension funds in our UK and US samples. 'Others' often include such assets as mortgage-backed securities, venture capital, private placement, properties, etc.

To test hypotheses 1 and 2 we analyze pension asset composition over the period 2000-2006 for a sample of UK companies and compare this composition to a sample of US companies. Specifically, we are interested in whether UK sponsoring companies have shifted pension funds from equity to debt securities during the *Disclosure* period and the *Full Recognition* period, and whether this switch has occurred in US sponsoring companies during the *Partial Recognition* and the *Full Recognition* periods.

To test hypotheses 3a and 3b, we construct a model that explains the cross-sectional variation in the percentage of pension funds allocated to equity securities ($rEQUITY_{it}$). The initial model is:

$$rEQUITY_{it} = \beta_0 + \beta_1 IMPACT_{it} + \beta_2 FUND_{it} + \beta_3 FUND_{it}^2 + \beta_4 HOR_{it} + \beta_5 LEV_{it} + \beta_6 DIVP_{it} + \beta_7 TAXR_{it} + \beta_8 SDCF_{it} + \beta_9 SIZE_{it} + \beta_{10} FAGE_{it} + \beta_{11} CLOSE_{it} + \varepsilon_{it} \quad (1)$$

The dependent variable in Equation (1), $rEQUITY_{it}$, is the market value of pension assets allocated to equity securities divided by the market value of total pension assets for firm *i* in year *t*. The main test variable in Equation (1) is $IMPACT_{it}$, which measures the potential impact of the new accounting standards on company *i* in year *t*. As the impact relates primarily to the relative size of the pension plan, we use the following four measures:

(i) $EXPOS1_{it}$: The fair value of pension assets deflated by book value of shareholders' equity for firm *i* in year *t*. A change in the market value of pension assets affects shareholders' equity directly, ceteris paribus. Therefore, $EXPOS1_{it}$ captures the company's exposure to the volatility in the market value of pension assets and net

pension surplus/deficit.

(ii) $EXPOS2_{it}$: The Projected Benefit Obligation (*PBO*) deflated by book value of shareholders' equity for firm *i* in year *t*. A change in the discount rate will directly affect the projected pension obligation, and depending on the pension asset mix may affect shareholders' equity. Therefore, $EXPOS2_{it}$ captures the company's exposure to the volatility in discount rates.

(iii) $ACTGL1_{it}$: The absolute value of realized actuarial gains/losses deflated by the shareholders' equity for firm *i* in year *t*. A higher magnitude of actuarial gains/losses is primarily the result of a larger difference between expected and realised pension asset returns; ceteris paribus, this should lead to more volatile shareholders' equity. Therefore, $ACTGL1_{it}$ captures the firms' exposure to changes in pension asset values.

(iv) $ACTGL2_{it}$: $ACTGL1_{it}$ divided by the percentage of pension funds allocated to equity for firm *i* in year *t*. A lower percentage of pension funds invested in equities would result in a lower magnitude of actuarial gains/losses. Hence, there might be a mechanical positive relation between $ACTGL1_{it}$ and $rEQUITY_{it}$. The scaling of $ACTGL1_{it}$ by the percentage of pension funds allocated to equity should mitigate this mechanical relation. Therefore, $ACTGL2_{it}$ proxies for the expected volatility reflected in actuarial gains/losses assuming all pension funds are invested in equities.

In calculating $EXPOS1_{it}$, $EXPOS2_{it}$, and $ACTGL1_{it}$ we adjust shareholders' equity by undoing the immediate recognition of actuarial gains/losses and the recognition of net pension surplus/deficit for early adopters.

We include $FUND_{it}$ and $FUND^2_{it}$ as a measure of the funding status of firm *i*'s pension fund in year *t*. These variables are included to capture the tax and regulatory influences on pension fund asset allocation. In general, the tax-deductibility of pension contributions in the UK and the US should induce companies to pre-fund their pension plans; companies that are

subject to higher tax rates should have even greater incentives to pre-fund their pension plans. However, prior literature is mixed as to the influence of funding status on pension asset allocation. Black (1980) and Tepper (1981) argue that since returns on pension assets are not taxed, these assets should be invested in the most heavily taxed securities, presumably bonds. Their argument suggests no association between funding levels and asset allocation as all companies invest in bonds regardless of funding levels.

Harrison and Sharpe (1983) argue that the existence of the Pension Benefit Guaranty Corporation (*PBGC*) in the US provides a (US) company with a put option on its extremely under-funded pension obligation. Together with limited tax deductibility in the case of extremely over-funded plans, they argue that funding and asset-allocation decisions are joint and extreme. To maximize tax benefits on one hand and the value of the *PBGC* option on the other hand, companies should either over-fund the pension plan and allocate all the assets to bonds, or under-fund and allocate all the assets to equities. Although in practice funding/asset-allocation decisions are rarely extreme, this argument supports a negative relation between funding levels and allocations to equities. A serious caveat is that the value of the *PBGC* put option in the US has declined over time and in particular since the 1986 Tax Reform Act. Also, an insurance company such as the *PBGC* did not exist in the UK until 2006.[11] Therefore, the incentive to allocate pension assets to equity securities in cases of extreme under-funding may be of a second order nature.

Bader (1991) argues that companies strive to minimize the volatility of future pension contributions. These contributions are fairly predictable for moderate funding levels, but less predictable for more extreme levels. To reduce the volatility of pension contributions, Bader (1991) argues that extremely over-funded and under-funded plans should invest in bonds, while only moderately funded plans should increase allocation to equities. His argument

suggests an inverted U-shape relation between funding levels and the allocation to equities.

Based on these arguments, we include both $FUND_{it}$ and $FUND^2_{it}$ to accommodate the possibility of a non-linear relation between funding levels and asset allocation.[12] The funding status is measured as the fair value of pension assets over the *ABO* for firm *i* in year *t*.[13]

We include HOR_{it} to control for the horizon of the pension obligation. Specifically, pension fund managers that aim at reducing the volatility of pension deficits should take into consideration the horizon of the pension obligation. While pension obligations to retirees are relatively short-term and are primarily affected by interest rates, pension obligations to active employees are relatively long-term and are primarily affected by salary increases. As bonds are more correlated with interest rate changes and stocks are more highly correlated with salary increases, companies with a relatively young workforce should invest more in stocks and less in bonds. Consequently, we expect a positive correlation between investment horizon and allocation to equity securities. HOR_{it}, is measured as the natural logarithm of the ratio of *PBO* to current service cost for firm *i* in year *t*. Our measure differs from Amir and Benartzi (1999), who use *ABO* in their calculation, since *ABO* is not available for UK firms. However, we believe that our measure is a reasonable proxy for investment horizon since a workforce which is closer to retirement should generate a larger service cost relative to a young workforce. We also recognize the fact that an older workforce would likely lead to a larger *PBO*, ceteris paribus; however, we believe this impact is not as influential as the service cost impact. Overall, an older workforce should lead to a smaller ratio of *PBO* to service cost, indicating a shorter investment horizon. To summarize, we expect a positive

[11] A government regulatory body such as the *PBGC* did not exist in the UK during the sample period, but exists today (see Financial Economics Roundtable, March 2005).

[12] Amir and Bernatzi (1999) documented an inverted-U relation between funding status and the percentage invested in equities.

[13] We define funding status in this way to be consistent with prior studies (Amir and Bernatzi, 1999). Since ABO is not available for UK companies, we calculate ABO based on the formula proposed in Amir and Bernatzi (1999): $ABO = PBO / (1+G)^N$, where G is the assumed projected salary increase and N is pension fund's investment horizon.

relation between HOR_{it} and the amount invested in equities.

We acknowledge that our horizon variable (HOR_{it}) may be subject to measurement error. To mitigate this problem, we include a variable that measures firm age ($FAGE_{it}$). More mature firms are likely to have more mature workforce and hence a shorter investment horizon. Thus, we expect a negative relation between firm age and percentage allocation to equities. Firm age is measured as the natural logarithm of number of years since the year of incorporation. If the date of incorporation is not available, then the year in which the company appeared on the database (Datastream for UK firms and CRSP for US firms) was used as a proxy for year of incorporation.

We include two control variables that capture the influence of debt contracts and dividend payout policy. As defined benefit pension plans are reported on sponsoring companies' balance sheets, the pension liability and corresponding investment portfolio may be affected by certain contractual arrangements. In particular, companies that are closer to the violation of debt covenants have stronger motives to improve asset/liability matching in order to reduce pension deficits on the balance sheet. Better asset/liability matching would also reduce the volatility of shareholders' equity and future pension contributions, which in turn would reduce the volatility of dividends. We expect companies with tighter debt covenants and higher dividends payout ratios to be more concerned about pension asset/liability matching. Therefore, to capture the effect on leverage and dividend policy on pension asset management, we include financial leverage (LEV_{it}) and dividends payout ratio ($DIVP_{it}$); we expect the coefficients on these variables to be negatively associated with the amount invested in equity. Financial leverage (LEV_{it}) is, measured as long term debt divided by the sum of long term debt and market value of equity for firm *i* in year *t*. Dividend payout ratio ($DIVP_{it}$) is measured as dividends per share divided by retained earnings per share for firm *i* in year *t*. If current retained earnings are negative, then the variable is measured as the

average dividends per share over the current and past two years divided by average retained earnings per share over the current and past two years.

Since returns on pension funds are not taxed, pension assets should be invested in the most heavily taxed securities, presumably bonds. Furthermore, companies subject to higher tax rates should have greater incentives to allocate more pension assets to bonds. Therefore, we include the company's effective tax rate ($TAXR_{it}$), measured as total tax expense divided by pre-tax income for firm *i* in year *t*. If current pre-tax income is negative, we use the average tax expense over the current and past two years divided by the average pre-tax income over the current and past two years.

We also include the volatility of operating cash flows and firm size to capture firm risk. It has been documented by Friedman (1983) and Bodie et al. (1984) that companies tend to offset high corporate risk by investing more of the pension assets in bonds. This policy of offsetting risk through the pension fund may reflect management preference to avoid making contributions to the pension fund when operating cash flows are low.[14] Thus, we expect a negative correlation between the variability of operating cash flows and equity allocation. In addition, companies with more diversified operations would prefer to assume more risk in their pension fund. To the extent that larger firms are more diversified, we would expect a positive association between firm size and allocation to equities. The volatility of operating cash flows ($SDCF_{it}$) is measured as the standard deviation of operating cash flows over the current and past four years, deflated by book value of common equity for *i* in year *t*. Firm size ($SIZE_{it}$) is measured as the natural logarithm of market value of equity for firm *i* in year *t*.

Finally, as many companies move away from defined benefit to defined contribution

[14] Specifically, if operating cash flows are volatile and the pension assets are invested in equities, the plan is likely to become under-funded when operating cash flows are low. As a result, the company would have to make large contributions to the pension fund in times of low operating cash flows.

pension plans, many defined benefit pension plans are closed to new entrants. This feature could have a significant effect on pension asset allocation, although we are unable to predict the direction of this effect. We include in our model an indicator variable ($CLOSE_{it}$) that is equal to one if the principal defined benefit plan is closed to new entrants, and zero otherwise.

To directly test our hypotheses, we define two dependent variables: The first one computes the change in the percentage of assets allocated to equities during the *Disclosure* period. For UK companies, this period begins in year 2000 and ends one year prior to adoption of *FRS* 17 or *IAS* 19, as follows:

rDISCLOSE = *rEQUITY* (year 2000) - *rEQUITY* (Pre-Adoption year).[15]

The second dependent variable computes the change in percentage of assets allocated to equities during the *Full Recognition* period. For UK companies, this period begins one year prior to adoption of *FRS* 17 / *IAS* 19 and ends one year subsequent to adoption, as follows:

rADOPT = *rEQUITY* (Pre-Adoption year) - *rEQUITY* (Post-Adoption year).

Similarly, we compute *rDISCLOSE* and *rADOPT* for US companies during the *Partial Recognition* and *Full Recognition* periods, respectively. These variables are defined as follows:

rDISCLOSE = *rEQUITY* (year 2000) - *rEQUITY* (Pre-Adoption year),

rADOPT = *rEQUITY* (Pre-Adoption year) - *rEQUITY* (Adoption year).

We estimate the following empirical models:

$$rDISCLOSE_i = \beta_0 + \beta_1 IMPACT_i + \beta_2 FUND_i + \beta_3 FUND_i^2 + \beta_4 HOR_i + \beta_5 LEV_i + \beta_6 DIVP_i + \beta_7 TAXR_i + \beta_8 SDCF_i + \beta_9 SIZE_i + \beta_{10} FAGE_i + \beta_{11} CLOSE_i + \varepsilon_i \quad (2)$$

$$rADOPT_i = \delta_0 + \delta_1 IMPACT_i + \delta_2 FUND_i + \delta_3 FUND_i^2 + \delta_4 HOR_i + \delta_5 LEV_i + \delta_6 DIVP_i + \delta_7 TAXR_i + \delta_8 SDCF_i + \delta_9 SIZE_i + \delta_{10} FAGE_i + \delta_{11} CLOSE_i + \eta_i \quad (3)$$

where the independent variables are measured at the end of the relevant period. In addition, we estimate equations (2a) and (3a) using first differences of the independent variables. Each independent variable is measured as the difference between the level of the variable at the beginning of the period (e.g., *Disclosure period*) and its level at the end of the period:

$$rDISCLOSE_i = \beta_0 + \beta_1 \Delta IMPACT_i + \beta_2 \Delta FUND_i + \beta_3 \Delta FUND_i^2 + \beta_4 \Delta HOR_i + \beta_5 \Delta LEV_i + \beta_6 \Delta DIVP_i + \beta_7 \Delta TAXR_i + \beta_8 \Delta SDCF_i + \beta_9 \Delta SIZE_i + \beta_{10} \Delta FAGE_i + \beta_{11} \Delta CLOSE_i + \varepsilon_{it} \quad (2a)$$

$$rADOPT_i = \delta_0 + \delta_1 \Delta IMPACT_i + \delta_2 \Delta FUND_i + \delta_3 \Delta FUND_i^2 + \delta_4 \Delta HOR_i + \delta_5 \Delta LEV_i + \delta_6 \Delta DIVP_i + \delta_7 \Delta TAXR_i + \delta_8 \Delta SDCF_i + \delta_9 \Delta SIZE_i + \delta_{10} \Delta FAGE_i + \delta_{11} \Delta CLOSE_i + \eta_i \quad (3a)$$

We estimate equations (2), (2a), (3) and (3a) for UK and US companies. Table 1 provides definitions of all of our variables.

(Table 1 about here)

We use ordinary least square (*OLS*) to estimate the above equations. Petersen (2006) argues that residuals may be correlated across firms or across time in panel data and therefore *OLS* standard errors may be biased. In this study, it is possible that the unspecified determinants of the dependent variables are correlated both over time and across firms. For example, if the equity market as a whole is volatile, then all firms may shift away from

[15] Although the Disclosure period begins in year 2000, in some of our tests we use year 2001 as the starting year because many observations for year 2000 are missing.

volatile equities to less volatile bonds. On the other hand, the strategy of pension asset allocation could also be driven by some unspecified firm-specific factors, which will give rise to a firm effect in the error terms. The presence of positive correlation among error terms results in underestimated standard errors and thus inflated *t*-statistics. To address such econometric concern, we employ two-dimension clustering suggested by Petersen (2006) to accommodate the possibility of both time effect and firm effect in such panel data.

5. Sample Selection and Descriptive Statistics

To obtain our initial UK sample we selected those firms from the FTSE 350 that sponsor defined benefit pension plans over fiscals 2000-2006.[16] Approximately 250 of the FTSE 350 sponsor a defined benefit pension plan. Information on market value of pension assets, actuarial present value of pension liabilities, pension actuarial assumptions, actuarial gains/losses and details of pension asset allocation are collected from annual financial statements.[17] All other financial data for UK companies are from Datastream.

Data for US companies' pension asset allocation until 2004 are collected from *Pensions and Investments*, a periodical survey that covers the largest 1,000 pension funds in the US. Of this 1,000, approximately 300 pension funds relate to defined benefit plans for publicly traded firms (the remainder are sponsored by private firms, unions, or government entities, or are foreign companies listed in the US). Asset allocation data for 2005-2007 are collected from notes to the annual financial statements. Financial data for US companies are from Compustat. After removing observations with missing data, the sample consists of 3,257 firm-year observations, including 1,351 observations for the UK sub-sample and 1,906 observations for the US sub-sample.

[16] Fiscal 2006 according to Compustat definition includes data for the first half of 2007.
[17] Data on pension asset allocation for 2000 for UK firms is from *Pension Funds and their Advisors*.

Table 2 provides descriptive statistics for the UK and US sub-samples. Over the entire sample period, UK companies allocate, on average, 63% of their pension assets to equities, whereas US companies allocate, on average, 62% to equities. The magnitude of actuarial gains/losses (*ACTGL1*, *ACTGL2*) is slightly higher in US than in UK companies. However, the size of the pension plan relative to shareholders' equity is larger in UK than in US firms, as reflected by higher means and medians of *EXPOS1* and *EXPOS2* (statistical tests not reported). As for other variables, the UK and US sub-samples are similar to each other in terms of funding status (*FUND*), pension horizon (*HOR*), firm age (*FAGE*) and effective tax rates (*TAXR*). US companies are less risky as reflected by lower volatility of cash flows (*SDCF*) and larger firm size (*SIZE*). US companies also have lower dividend payout ratios and are more highly leveraged than UK companies.[18]

(Table 2 about here)

By end of fiscal 2006 a total of 136 UK companies in our sample (58%) have closed their primary defined benefit pension plans to new entrants. In contrast, only 76 US companies in our sample (21%) have closed their primary defined benefit pension plans to new entrants by 2006 (not tabulated). The difference between US and UK companies (significant at the 0.01 level) is consistent with our claim that UK companies take actions to reduce the effect of pension accounting on financial statements.[19]

Figure 1 presents the mean/median percentage of pension assets allocated to equity and debt securities for UK and US companies. Focusing on the means, the top two lines show that UK companies reduced their allocation to equities during the sample period while US companies maintained a relatively stable allocation to equities. The bottom two lines show

[18] All continuous explanatory variables are winsorized at 1% and 99% to mitigate the effect of extreme observations, except $TAXR_{it}$ and $DIVP_{it}$ which are winsorized at 5% and 95% to remove negative values.

that UK firms increased the allocation to bonds while US firms display a relatively stable allocation to bonds during the same period. Plots based on medians exhibit similar patterns. These results are consistent with the argument that changes in asset allocation of UK companies during the *Disclosure* and *Full Recognition* periods of *FRS* 17 / *IAS* 19 were driven by the accounting change rather than by general economic conditions.

(Figure 1 about here)

Figure 2 depicts the trend of pension asset allocation around the adoption of *FRS* 17 / *IAS* 19 for UK companies. For each company, we identify the adoption year and denote it as AY(0). For the majority of our sample, the adoption year is fiscal 2005, however, 54 companies in our sample elected to adopt *FRS* 17 prior to the mandatory year. Then, we plot the mean (median) percentage of pension assets allocated to equities and bonds from year AY(-3) to AY(3). Both Figure 2a and Figure 2b exhibit a decline in pension funds invested in equities, and an upward trend in the percentage invested in bonds. Overall, Figure 2 exhibits a consistent shift away from equities to bonds throughout the sample period.

(Figure 2 about here)

When comparing asset allocations across US and UK, we rely on the assumption that the correlation between equity and debt markets in these countries is sufficiently high. Also, it is possible that asset allocation is influenced not only by corporate actions but also by changes in market values of stocks and bonds.[20] Table 3, Panel A presents annual stock and bond returns for the US and UK markets, based on Dimson et al. (2002, 2004, and 2007). As

[19] Greenwich Associates report that 22% of large defined benefit pension plans are closed to new entrants in the US (McSherry, 2006).

[20] Informal discussions with pension experts in the UK suggest that pension asset management has changed over time. Until the mid 1990s, when balanced management was the main investment strategy in the UK, the pension fund trustees set a target strategic asset allocation (SAA) for fund managers (e.g. 70% equity, 20% bonds, 10% cash), but they also set some bounds around that (e.g. %equity = 70% +/- 5%). Good equity performance could lead to the 75% upper bound being breached. The manager would then have to argue for the bound to be increased (temporarily) or be asked to sell equities and redistribute the funds to bring the SAA back in line. Since the late 1990s, the situation changed as the implication of pension deficits became more significant. Liability-driven investing replaced the SAA that was set independent of liabilities. Currently, there is less flexibility over the SAA than previously, and rebalancing occurs more frequently.

can be seen, these markets move together, although US markets seem more volatile. The Panel also presents indices based on cumulative stock and bond returns for each country. Using these indices, we compute hypothetical allocation to equity securities assuming that asset allocation is determined only by changes in relative prices of stocks and bonds. We present these hypothetical allocations in Panel B of Table 3.

In addition, the portfolio analyses in Tables 4, 6 and 7 below are presented in two ways: First, we report actual asset allocation figures. Second, we report index-adjusted asset allocation figures, that is, removing changes in relative values of stocks and bonds since year 2000 and by isolating corporate rebalancing actions.

(Table 3 about here)

Table 4 provides data on the composition of pension assets for UK and US companies during 2000-2006. Panel A presents asset allocation as reported, whereas Panel B presents index-adjusted asset allocation data using market values of stocks and bonds in 2000. We also test whether the mean allocation to equities and bonds has changed during the sample period.

Panel A shows that from 2000 to 2006, UK companies decreased their allocation to equities by 16.2% and increased their allocation to bonds by 10%. During the same period, US sponsoring companies had a relatively stable allocation to equities and bonds. Statistical tests on the difference between 2001 and 2006 indicate that the decrease (increase) in allocation to stocks (bonds) in the UK was significant at the 0.01 level.[21] In contrast, US companies increased (decreases) the allocation to stocks (bonds) and these changes are significant at the 0.01 level.

Panel B presents results using adjusted asset allocation data. The adjustment is made by using average market values of stocks and bond that existed in 2000. This way, we isolate

[21] We conduct tests for differences between 2001 and 2006 because many observations for 2000 are missing.

the effect of corporate rebalancing on asset allocation. The decline in the allocation to stocks and the increase in the allocation to bonds are apparent. As for US companies, notice the decrease in the average allocation to equities and the small increase in the allocation to bonds from 2005 to 2006 (the adoption year of *SFAS* 158).

(Table 4 about here)

Table 5 presents the results from a nonparametric portfolio analysis of the association between *rEQUITY* and the explanatory variables. We report the mean *rEQUITY* by quintile for each independent variable, for both UK and US sub-samples. Our statistical test is based on a comparison of the mean *rEQUITY* for quintile 1 (smallest values) and quintile 5 (largest values).

The results indicate that for the UK sub-sample, when we partition using the four proxies for the impact of *FRS* 17 / *IAS* 19 (*ACTGL1, ACTGL2, EXPOS1 and EXPOS2*), firms with the largest expected impact (quintile 5) have a significantly (at the 0.04 level or better) smaller percentage allocated to equity securities relative to firms with the smallest expected impact (quintile 1). In contrast, the results for US companies indicate that larger values on these variables do not lead to a lower percentage allocated to equities. In fact, larger values of *ACTGL1* lead to a higher allocation to equities. Overall, these results suggest that companies for which the expected impact of *FRS* 17 / IAS 19 is larger, would reduce pension fund allocation to equities and increase fund allocation to bonds. The comparison of UK and US results provides some assurance that the move from equities to bonds is not driven by market factors.

With respect to the other variables, the results in Table 5 show that younger UK companies (*FAGE*) allocate more to equities (at the 0.01 level). Also, as expected by the risk offsetting argument, more risky companies, as reflected by greater cash flow variability (*SDCF*), higher financial leverage (*LEV*), or smaller firm size (*SIZE*), invest significantly (at

the 0.01 level) less in equities. As for the US sub-sample, those companies with longer investment horizon (*HOR*), higher financial leverage (*LEV*), or larger firm size (*SIZE*) invest significantly (at the 0.10 level or better) more in equities.

(Table 5 about here)

6. Empirical Results

We now turn to testing the hypotheses developed in Section 3. Table 6 provides results for testing whether UK companies changed their pension asset allocation during the *Disclosure* period of *FRS* 17 (Hypothesis 1). Panel A presents results using actual asset allocation data (contemporaneous market values of stocks and bonds). The results show that UK companies increased (decreased) their allocation to bonds (stocks) during the *Disclosure* period (at the 0.03 level or better). In contrast, during the *Partial Recognition* period, US companies decreased (increased) their average allocation to bonds (stocks) and these changes are significant at the 0.01 level.

Panel B presents results using index-adjusted market values of stocks and bonds, where asset allocation is computed using market values that existed in 2000. The changes in asset allocation in UK companies are in the same direction as in Panel A, however, for equities, the change is not significant at the 0.10 level. As for US companies, the results are similar to those reported in Panel A.

The results in Panels A and B combined indicate that while UK companies decreased the allocation to equities and increased the allocation to bonds, US companies, on average, had an opposite strategy. However, the decline in the allocation to equities in UK companies is partly explained by the decline in stock prices in years 2001-2002. Nonetheless, US companies experienced similar stock price decline and still the allocation to equities increased. We interpret the difference in asset allocation between UK and US companies as

supporting our Hypothesis 1 – UK companies decreased their exposure to equities due to the new disclosure requirements of *FRS* 17.

(Table 6 about here)

Table 7 presents results for testing whether pension asset allocation changed around the adoption of *FRS* 17 / *IAS* 19 by UK companies and the adoption of *SFAS* 158 by US companies (Hypothesis 2). Panel A contains results with actual asset allocation data and Panel B uses index-adjusted market values of stocks and bonds to measure changes in asset allocation. The main test in this Table is the change in *%Equity* and *%Bond* from the pre-adoption to the post-adoption year (-1, +1). However, we also present test results for the change from the pre-adoption year to the adoption year (-1, 0) and from two years prior to adoption until two years after the adoption (-2, +2).

As Panel A shows, UK companies changed their pension asset allocation around the adoption of *Full Recognition* under *FRS* 17 / *IAS* 19. In particular, average allocation to equities decreased from an average of 63.5% in the pre-adoption year to an average of 59.0% in the post-adoption year (t = 5.41, p-value = 0.00). During the same period, average allocation to bonds increased from 29.6% to 32.7% (t = -2.91, p-value = 0.00). Additional tests for different periods substantiate this result. As for US companies, Panel A shows a minimal reduction in the allocation to equities without any significant change in the allocation to bonds. In sum, the results in Panel A support Hypothesis 2 in showing the reduction in the allocation to equities by UK companies and to a much lesser extent by US companies.

The results in Panel B (index-adjusted asset allocation data) are much more pronounced. Focusing on UK companies, the results are very similar to those reported in Panel A, except that the changes in allocation to equities and bonds, and the corresponding t-statistics, are larger. Moreover, average allocation to equities (bonds) by US companies

decreased (increased) and these changes are statistically significant at the 0.00 level from the pre-adoption year to the adoption year (-1, 0).

Overall, the results in Table 7 provide strong support for Hypothesis 2. In particular, the evidence suggests that UK as well as US companies modified their pension asset allocation policies by shifting pension assets from equity to debt securities. This shift reduces the effects of full recognition accounting on the balance sheet and comprehensive income.

(Table 7 about here)

To test Hypothesis 3a, we estimate the cross-sectional association between the change in the allocation to equities and the expected impact of the standards during the *Disclosure* period (equations (2) and (2a)). The results of this analysis are presented in Table 8 for UK companies and in Table 9 for US companies.

Table 8, Panel A, presents results for estimating equation (2). The dependent variable, *rDISCLOSE*, is the change in the allocation to equities during the *Disclosure* period. The independent variables, which are measured at the pre-adoption year, include the main test variables - *ACTGL1*, *ACTGL2*, *EXPOS1* and *EXPOS2*. These variables capture the expected cross-sectional impact of the new pension disclosures required under *FRS* 17.

The coefficients on *ACTGL1* and *ACTGL2* are positive, as expected, and significant at the 0.05 level. This result suggests that companies with larger actuarial gains/losses shift more funds from equity to debt securities to reduce the volatility of pension deficits. Also, the coefficients on *EXPOS1* and *EXPOS2* are positive, as expected, but only *EXPOS2* is significant at the 0.05 level. This result suggests that UK companies with larger pension liabilities relative to shareholders' equity shift more funds from equities to bonds. This result supports the argument that new pension disclosures compelled UK companies to increase the allocation to bonds in order to decrease the probability of future pension deficits.

The coefficients on the control variables generally obtain the expected sign, but only two variables are significant at the 0.10 level or better. Specifically, the coefficient on *FAGE* is positive suggesting that more mature companies shift more pension assets from equity to debt securities. We also find that companies with more volatile cash flows shift more pension assets from equity to debt securities, consistent with the risk offsetting argument.

Panel B of Table 8 presents results for estimating equation (2a), in which independent variables are measured as first differences over the *Disclosure* period. The Table exhibits positive coefficients on all four test variables -- *ACTGL1*, *ACTGL2*, *EXPOS1* and *EXPOS2* -- and all the coefficients are significant at the 0.10 level or better. This result, which supports Hypothesis 3a, suggests that companies with larger actuarial gains/losses and larger pension plans relative to shareholders' equity shift more pension assets from equity to debt securities to reduce the likelihood of pension deficits.

The evidence in Panel B also highlights the role of funding levels and investment horizon in explaining changes in asset allocation during the *Disclosure* period. Specifically, UK companies that experienced an increase in funding levels over the *Disclosure* period shifted more assets from equities to bonds. In addition, companies that experienced an increase in the investment horizon shifted less assets from equity to debt securities.

(Table 8 about here)

Table 9 presents results for estimating equations (2) and (2a) for US companies during the *SFAS* 87 *Partial Recognition* period. In general, we find weak or no association between changes in assets allocated to equity securities during the *Partial Recognition* period (*rDISCLOSE*) and the main test variables *ACTGL1*, *ACTGL2*, *EXPOS1* and *EXPOS2*. The coefficients on the main test variables are of smaller magnitude compared with those in Table 8. Also, only the coefficients on *ACTGL1* and *ACTGL2* in Panel A and the coefficient

on *ACTGL2* in Panel B are significant at the 0.10 level, while the other coefficients are not statistically different from zero.

The results in Tables 8 and 9 support the argument that UK companies with larger actuarial gains/losses and larger pension plans relative to shareholders' equity shifted more pension assets from equity to debt securities during the *FRS* 17 *Disclosure* period. Such a relation is not found in US companies during the *SFAS* 87 *Partial Recognition* period. We attribute these findings, which support Hypothesis 3a, to the new disclosure requirements of *FRS* 17. In particular, these new pension disclosures prompted companies with larger pension plans relative to shareholders' equity to reduce the volatility of more visible and transparent pension deficits.

(Table 9 about here)

To test Hypothesis 3b, we estimate equations (3) and (3a). These equations model the cross-sectional association between the change in the allocation to equity securities and the expected impact of the standards during the *Full Recognition* period of *FRS* 17 / *IAS* 19 in the UK (Table 10) and *SFAS* 158 in the US (Table 11).

Table 10, Panel A, presents estimation results for equation (3). The coefficients on the main test variables *ACTGL1*, *ACTGL2*, *EXPOS1* and *EXPOS2* are positive and significant at the 0.10 level or better. This result, which supports Hypothesis 3b, suggests that UK companies with larger actuarial gains/losses and relatively larger pension plans shifted more assets from equity to debt securities around the adoption of *FRS* 17 / *IAS* 19.

In addition, several of the control variables are significant in explaining the change in asset allocation during the UK *Full Recognition* period. Specifically, the coefficients on *FUND* are negative (significant at the 0.05 level) and the coefficients on $FUND^2$ are positive (significant at the 0.05 level), consistent with Bader's (1991) inverted U-shape association between allocation to equity securities and funding levels. Also, the coefficients on *HOR* are

negative (significant at the 0.05 level), as expected, suggesting that companies with shorter investment horizons shifted more assets from equity to debt securities. Finally, the coefficients on *DIVP* are positive (significant at the 0.10 level in 3 out of 4 specifications), suggesting that companies with higher dividend payout ratios shifted more assets from equity to debt securities, presumably to reduce the effect of the new standards on the volatility of shareholders' equity, and hence the volatility of dividends.

Panel B presents results for estimating equation (3a). The coefficients on the main test variables are positive, as expected, but only three are significant at the 0.05 level. This result corroborates the result in Panel A and provides additional support for Hypothesis 3b. This Panel also highlights the role of financial leverage in explaining the change in asset allocation during the *Full Recognition* period. In particular, companies that experienced an increase in financial leverage shifted more assets from equity to debt securities. A plausible motive could be to reduce the effect of pension deficits on the balance sheet and decrease the probability of violating debt covenants.

(Table 10 about here)

Table 11 presents results for estimating equations (3) in Panel A and (3a) in Panel B with US data. Focusing on Panel A, the coefficients on the main test variables *ACTGL1*, *ACTGL2*, *EXPOS1* and *EXPOS2* are positive and significant at the 0.01 level, which supports Hypothesis 3b. This result suggests that US companies with larger actuarial gains/losses and larger pension plans relative to shareholders' equity shifted more assets from equity to debt securities during the *SFAS* 158 *Full Recognition* period.

The coefficients on the control variables show that companies with longer investment horizon (i.e., younger workforce) shifted less assets from equity to debt securities. Also, consistent with the results in Table 10, companies with higher effective tax rates and larger financial leverage shifted more assets from equity to debt securities. Finally, companies with

pension plans that are closed to new participants shifted more assets from equity to debt securities.

Results in Panel B are in the same direction as those reported in Panel A, however, statistical inferences are weaker. The coefficients on *ΔACTGL1* and *ΔACTGL2* are positive and significant at the 0.05 level or better. However, the coefficients on *ΔEXPOS1* and *ΔEXPOS2* are virtually zero. The control variables *ΔLEV* and *ΔCLOSE* still exhibit positive and significant coefficients but the coefficients on *ΔHOR* and *ΔTAXR* are no longer significant.[22]

Overall, the results in Table 11 support Hypothesis 3b. In particular, we find that US companies shifted pension assets from equity to debt securities and that the magnitude of this shift is positively correlated with the magnitude of actuarial gains/losses and the relative size of the pension plan. Another interesting result that corroborates our findings is the positive coefficients on financial leverage – US companies with higher leverage shifted more assets from equity to debt securities.

(Table 11 about here)

7. Conclusions

FRS 17 and the revised *IAS* 19 radically changed accounting and reporting of defined benefit plans in the UK by initially introducing new market-based pension disclosures and subsequently requiring full balance sheet recognition of the pension surplus/deficit. In December 2006, the *FASB* issued *SFAS* 158 replacing the partial recognition method of *SFAS* 87 with full balance sheet recognition of defined benefit post-retirement plans. To reduce the effect of capital market fluctuations on reported earnings, these standards require that actuarial gains/losses shall be recognized in comprehensive income.

We investigate whether new market-based pension disclosures and subsequent full pension recognition under had any impact on pension asset allocation of UK companies. We also examine the asset allocation of US companies prior to and during the adoption of *SFAS* 158. We identify a *Disclosure* period as the period in which UK companies had to disclose all the required data under *FRS* 17 in the notes to the financial statements without formally recognizing the full pension surplus/deficit on the balance sheet. In addition, we identify a *Full Recognition* period around the adoption of either *FRS* 17 or *IAS* 19. We hypothesize that there exists a shift from equity to debt securities by UK companies during the *Disclosure* period of *FRS* 17 due to the higher visibility of pensions in the UK and the anticipation of full recognition. We also predict a decline in pension funds allocated to equity securities during the *Full Recognition* period, around the adoption of *FRS* 17 and *IAS* 19. We compare the pension asset allocation of these large UK firms with that of US large public companies during the period 2000-2006, taking into consideration the adoption of *SFAS* 158 in December 2006.

We find that during the *FRS* 17 *Disclosure* period UK companies reduced their pension fund exposure to equity securities and at the same time increased their allocation to debt securities. During the same period US companies maintained a stable asset allocation. We also find that UK companies decreased their allocation to equities during the *FRS* 17 / *IAS* 19 *Full Recognition* period. Similarly, US companies decreased their allocation to equities following the adoption of *SFAS* 158. Finally, cross-sectional analysis reveals that the shift from equity to debt securities is more pronounced in companies with relatively larger pension schemes and larger magnitudes of actuarial gains and losses.[23]

[22] Recall that our analysis does not include post-adoption data for US companies. Including data for fiscal 2007, the post-adoption year, could have a significant effect on the results in Panel B of Table 11.

[23] A report by the Committee on Investment of Employee Benefit Assets has estimated that switching to mark-to-market pension accounting would result in approximately $290bn in funds being shifted from equities to bonds (Brewsterin, 2005). This study provides timely empirical evidence on this issue.

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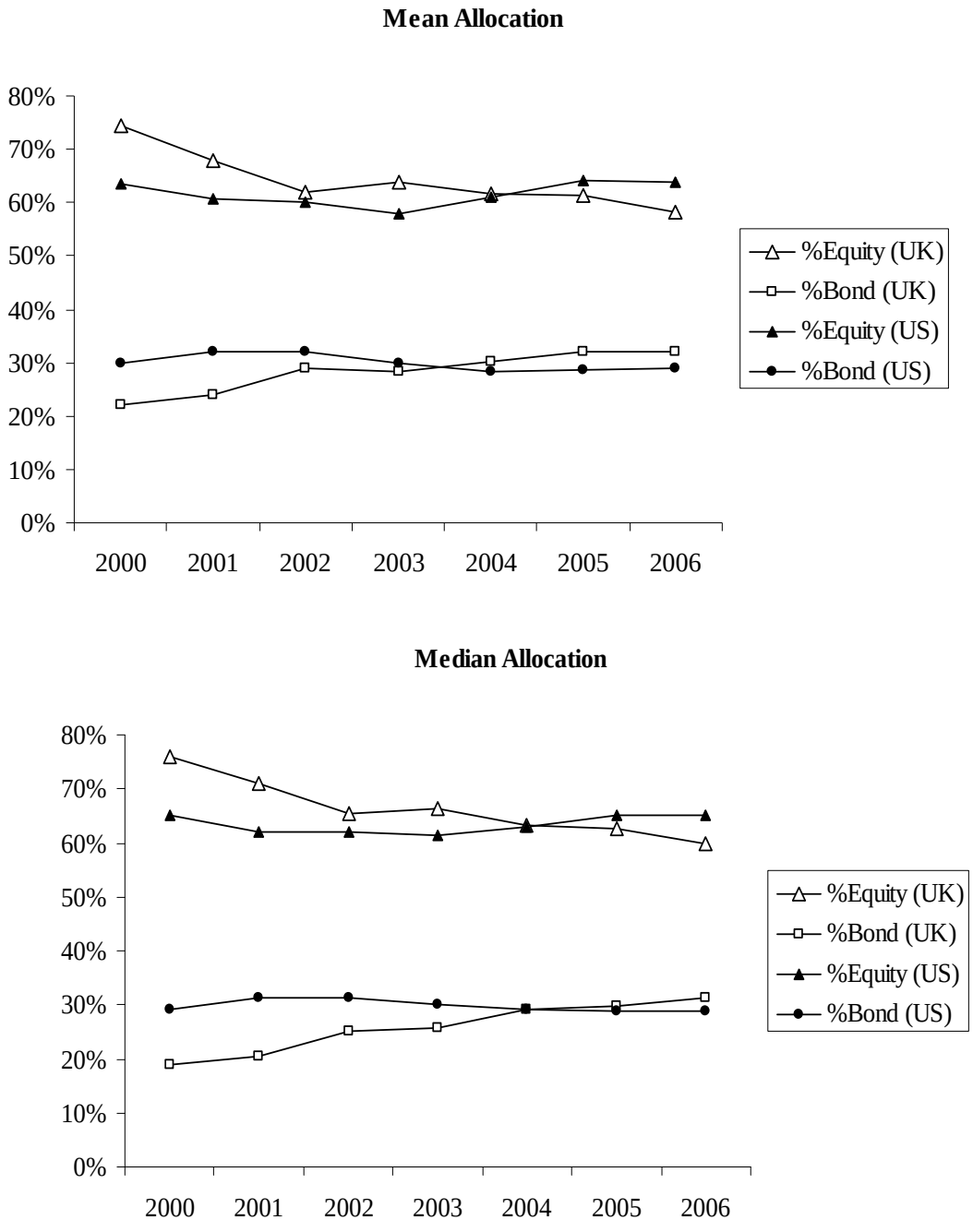
Figure 1
Pension Asset Allocation: UK vs. US Companies



The Figures plot mean and median percentage of pension assets allocated to equity securities and bonds for UK and US sponsoring companies during the sample period (2001-2006).

Figure 2
Pension Asset Allocation for UK Companies around the Adoption of Full Pension Recognition (*FRS* 17 or *IAS* 19)

Figure 2a: Mean Allocation

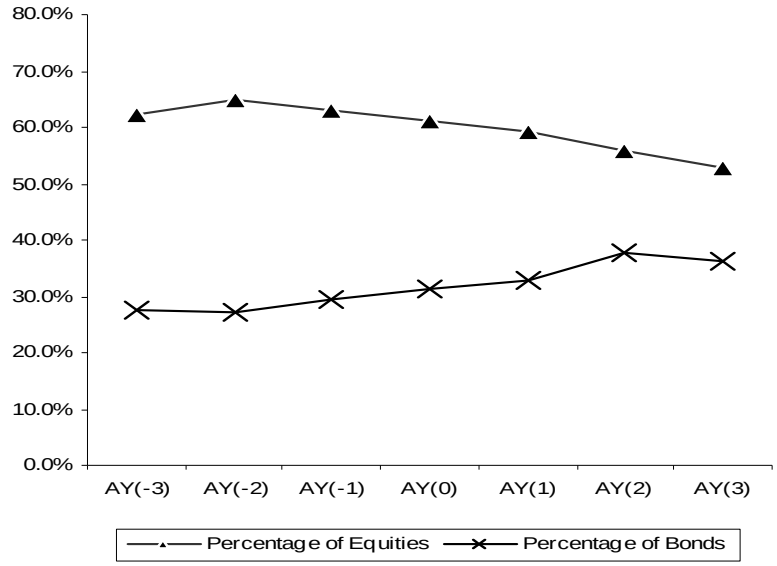
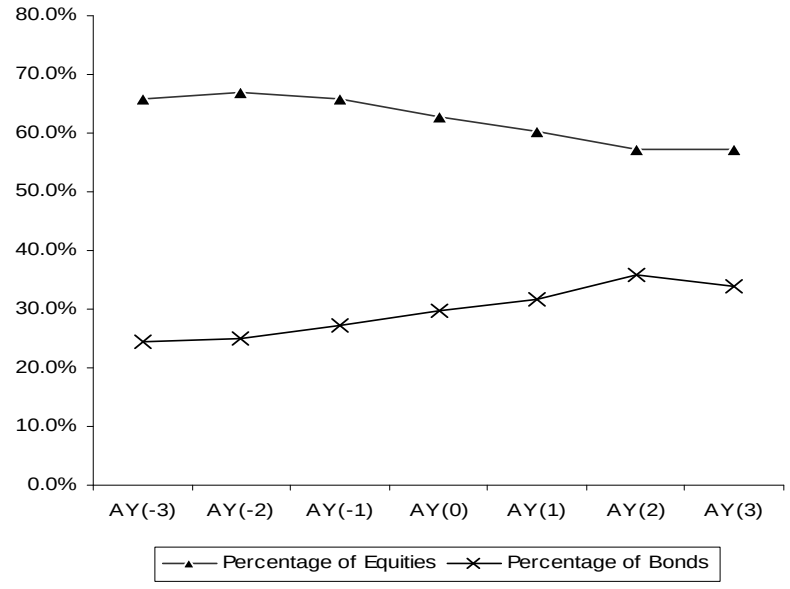


Figure 2b: Median Allocation



Note: The Figure plots mean and median percentage of pension assets allocated to equities and bonds for all the UK companies that adopted the full recognition method under *FRS* 17 or *IAS* 19. AY(0) denotes the year of adoption. Data availability varies considerably over time and in particular, the number of observations with AY(3) data is very small (about 20 observations).

Table 1
Variable Definitions

rEQUITY	The ratio of pension assets allocated to equity securities over the fair value of total pension assets at fiscal year end.
rDISCLOSE	For UK companies (US companies) this is the change in the percentage of assets allocated to equity securities in UK companies from fiscal 2000 (or 2001 if fiscal 2000 is missing) until one year prior to adoption of *FRS* 17 or *IAS* 19 (*SFAS* 158).
rADOPT	For UK companies this is the change in the percentage of assets allocated to equity securities from one year prior to adoption of *FRS* 17 or *IAS* 19. For US companies this is the change from one year prior to the adoption of *SFAS* 158 until the year of adoption.
ACTGL1	The magnitude of actuarial gains/losses, measured as the absolute value of realized actuarial gains/losses deflated by shareholders' equity at fiscal year end. We adjust shareholders' equity by undoing the immediate recognition of actuarial gains/losses and the recognition of net pension surplus/deficit for *FRS* 17 adopters. Winsorized at 1% and 99%.
ACTGL2	The magnitude of actuarial gains/losses assuming that all pension assets are invested in equities, measured as *ACTGL1* deflated by *rEQUITY*. Winsorized at 1% and 99%.
EXPOS1	Firm-specific pension asset exposure to *FRS* 17 volatility, measured as fair value of pension assets divided by shareholders' equity at fiscal year end. We adjust shareholders' equity by undoing the immediate recognition of actuarial gains/losses and the recognition of net pension surplus/deficit for *FRS* 17 adopters. Winsorized at 1% and 99%.
EXPOS2	Firm-specific pension obligation exposure to *FRS* 17 volatility, measured as projected benefit obligation (PBO) divided by shareholders' equity at fiscal year end. We adjust shareholders' equity by undoing the immediate recognition of actuarial gains/losses and the recognition of net pension surplus/deficit for *FRS* 17 adopters. Winsorized at 1% and 99%.
FUND	Funding ratio, measured as fair value of pension assets divided by ABO at fiscal year end. For UK firms, ABO is not reported. We approximate it based on the formula suggested in Amir and Benartzi (1999): $ABO=PBO/(1+G)^N$, where G is the assumed salary growth rate, *PBO* is the projected benefit obligation and N is the pension investment horizon, as defined below. Winsorized at 1% and 99%.
***FUND*^{2}**	*FUND* squared. Winsorized at 1% and 99%.
HOR	Investment horizon of pension assets, measured as the natural logarithm of the projected benefit obligation (*PBO*) over current service cost. Winsorized at 1% and 99%.
FAGE	Firm age, measured as the natural logarithm of number of years since the year of incorporation. If the date of incorporation is not available, then the year in which the company appeared on the database (Datastream for UK firms and CRSP for US firms) was used as a proxy for year of incorporation.
LEV	Financial leverage, measured as long term debt divided by the sum of long term debt and market value of equity at fiscal year end. Winsorized at 1% and 99%.

DIVP	Dividend payout ratio, measured as dividends per share divided by retained earnings per share. If retained earnings are negative, then it is measured as the average dividends over the current and past two years divided by average retained earnings over the current and past two years. Winsorized at 5% and 95%.
TAXR	Effective tax rate, measured as total tax expense over pre-tax income. If current pre-tax income is negative, then it is measured as the average tax expense over the current and past two years divided by the average pre-tax income over the current and past two years. Winsorized at 5% and 95%.
SDCF	The standard deviation of earnings before extraordinary items over the preceding 5 years, deflated by the book value of common equity at fiscal year end. Winsorized at 1% and 99%.
SIZE	Firm size, measured as the natural logarithm of market value of equity at fiscal year end. Winsorized at 1% and 99%.
CLOSE	Indicator variable, equal to one if the principal defined benefit plan is closed to new entrants, and zero otherwise.

Table 2
Descriptive Statistics for UK and US Companies over 2001-2006*

	UK Sample (1,351 observations)					US Sample (1,906 observations)				
Variable	**p25**	**Mean**	**P50**	**p75**	**STD**	**p25**	**Mean**	**p50**	**p75**	**STD**
rEQUITY	0.54	0.63	0.66	0.75	0.16	0.57	0.62	0.64	0.70	0.14
ACTGL1	0.01	0.11	0.09	0.17	0.18	0.03	0.13	0.07	0.20	0.24
ACTGL2	0.02	0.16	0.15	0.24	0.47	0.05	0.19	0.12	0.29	0.62
EXPOS1	0.16	1.04	0.49	1.14	1.42	0.22	0.82	0.45	0.99	0.97
EXPOS2	0.20	1.23	0.60	1.34	1.67	0.24	0.91	0.50	1.03	1.09
FUND	0.85	0.98	0.97	1.09	0.18	0.92	0.96	0.95	1.05	0.17
FUND^2	0.72	0.99	0.94	1.19	0.37	0.84	0.95	0.90	1.10	0.43
HOR	3.48	3.79	3.76	4.08	0.50	3.38	3.71	3.69	4.02	0.45
FAGE	2.64	3.30	3.43	4.16	1.03	3.30	3.49	3.66	4.09	0.81
DIVP	0.04	0.11	0.09	0.13	0.12	0.02	0.09	0.06	0.11	0.11
TAXR	0.27	0.32	0.30	0.34	0.12	0.28	0.33	0.34	0.39	0.10
SDCF	0.03	0.14	0.05	0.13	0.22	0.03	0.09	0.05	0.09	0.11
LEV	0.11	0.23	0.21	0.31	0.17	0.11	0.28	0.24	0.41	0.20
SIZE	6.97	7.90	7.72	8.53	1.24	7.94	8.93	8.93	9.87	1.53

*Note: The Table presents variable descriptive statistics for the UK (1,351 firm/year observations) and US (1,906 firm/year observations) samples. The samples consist of large companies that sponsor defined benefit pension plans for which financial and pension asset allocation data were available during the period 2001-2006. See Table 1 for variable definitions.

Table 3
Historical Annual Returns on Equities and Bonds in the US and the UK*

Panel A: Historical Annual Returns by Country and Portfolio Type

	UK Data				US Data			
Year	**Equities**	**Index**	**Bonds**	**Index**	**Equities**	**Index**	**Bonds**	**Index**
2000	-4.9%	1.0000	1.0%	1.0000	-10.9%	1.0000	21.5%	1.0000
2001	-12.9%	0.8710	1.0%	1.0100	-11.0%	0.8900	3.7%	1.0370
2002	-22.3%	0.6768	10.4%	1.1150	-20.9%	0.7040	17.8%	1.2216
2003	21.2%	0.8202	1.3%	1.1295	31.6%	0.9265	1.4%	1.2387
2004	13.1%	0.9277	8.1%	1.2210	12.5%	1.0423	8.5%	1.3440
2005	21.3%	1.1253	9.8%	1.3407	6.4%	1.1090	7.8%	1.4488
2006	16.4%	1.3098	-0.95%	1.3279	15.9%	1.2853	1.2%	1.4662

Panel B: Effect of Changes in Market Values on Initial Equity Allocation

Country	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
UK	75.0%	72.1%	64.6%	68.6%	69.5%	71.6%	74.7%
US	65.0%	61.4%	51.7%	58.1%	59.0%	58.7%	61.9%

*Notes:

1. Panel A presents annual percentage returns on stocks and bonds in the US and in the UK for the sample period. The Panel also presents an index equal to 1 plus cumulative annual returns.
2. Panel B computes hypothetical allocation to equity securities assuming portfolio composition is affected only by relative changes in market values of stocks and bonds. The initial allocation at the end of 2000 is assumed to be 75% to equities in the UK and 65% to equities in the US. These initial allocations are very similar to the actual average allocation. For example, UK allocation to equities in 2001 (72.1%) is computed as follows: (75 x 0.8710) / [(75 x 0.8710) + (25 x 1.0100)] = 72.1.
3. Data for this table was retrieved from Dimson et al. (2002, 2004, and 2007).

Table 4
Composition of Pension Assets by Country, Year and Portfolio Type*

Panel A: Portfolios based on contemporaneous market values

Asset Category	2000	2001	2002	2003	2004	2005	2006	*t*-Test (*p*-val.) (2006 vs. 2001)
UK Sample								
Observations	144	239	245	252	248	238	220	
-Equity	74.4%	67.8%	61.9%	63.7%	61.6%	61.4%	58.2%	**-6.08 (0.00)**
-Bonds	22.2%	24.1%	28.9%	28.2%	30.3%	32.1%	32.2%	**5.27 (0.00)**
-Others	3.4%	8.1%	9.2%	8.1%	8.1%	6.5%	9.6%	1.33 (0.18)
US Sample								
Observations	287	308	306	303	307	346	370	
-Equity	63.5%	60.8%	60.0%	58.0%	61.1%	64.1%	63.8%	3.24 (0.00)
-Bonds	29.8%	32.2%	32.1%	30.0%	28.4%	28.6%	28.9%	**-3.80 (0.00)**
-Others	6.7%	7.0%	7.9%	12.0%	10.5%	7.3%	7.3%	0.57 (0.57)

Panel B: Portfolios based on index-adjusted market values

Asset Category	2000	2001	2002	2003	2004	2005	2006	*t*-Test (*p*-val.) (2006 vs. 2001)
UK Sample								
Observations	144	239	245	252	248	238	220	
-Equity	74.4%	73.8%	70.3%	69.3%	65.7%	63.2%	58.4%	**-9.07 (0.00)**
-Bonds	22.2%	19.9%	21.3%	22.7%	25.6%	29.5%	31.8%	**8.39 (0.00)**
US Sample								
Observations	287	308	306	303	307	346	370	
-Equity	63.5%	64.3%	75.5%	64.9%	67.3%	71.3%	67.1%	**2.85 (0.00)**
-Bonds	29.8%	29.2%	23.3%	25.1%	24.3%	24.2%	26.5%	**-3.43 (0.00)**

*Note: The Table provides comparative information on pension asset allocation of US and UK companies. Panel A presents data based on contemporaneous market values, whereas Panel B presents index-adjusted data based on market values that existed in year 2000. The samples contain large US and UK companies that sponsor defined benefit pension plans for which financial and pension asset allocation data were available during 2001-2006. The *t*-tests (and corresponding *p*-values) are for the difference between allocation in 2006 and allocation in 2001. We also report pension asset composition for fiscal 2000 for benchmarking.

Table 5

Mean Allocation to Equities (*rEQUITY*) by Quintiles of the Independent Variables (Pooled 2001-2006)*

	UK sample (1,351 firm/year observations)						US sample (1,906 firm/year observations)					
Independent Variables	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**t-test Q5 – Q1**	**Q1**	**Q2**	**Q3**	**Q4**	**Q5**	**t- test Q5-Q1**
ACTGL1	0.67	0.62	0.60	0.63	0.64	**-2.03(0.04)**	0.61	0.63	0.63	0.64	0.63	1.61 (0.11)
ACTGL2	0.68	0.63	0.63	0.63	0.59	**-5.41(0.00)**	0.64	0.64	0.62	0.64	0.61	**-4.10 (0.00)**
EXPOS1	0.65	0.65	0.62	0.64	0.60	**-3.17(0.00)**	0.62	0.61	0.64	0.65	0.62	-0.28 (0.78)
EXPOS2	0.65	0.65	0.61	0.65	0.60	**-3.44(0.00)**	0.62	0.61	0.63	0.65	0.62	-0.50 (0.62)
FUND	0.63	0.66	0.62	0.61	0.63	0.98(0.32)	0.62	0.63	0.63	0.62	0.63	1.16 (0.25)
HOR	0.62	0.65	0.66	0.60	0.63	1.14(0.26)	0.60	0.63	0.64	0.62	0.65	**5.44 (0.00)**
FAGE	0.64	0.68	0.62	0.62	0.59	**-3.44(0.00)**	0.62	0.64	0.63	0.63	0.62	-0.35 (0.72)
DIVP	0.62	0.63	0.59	0.67	0.64	1.58(0.12)	0.63	0.64	0.63	0.63	0.62	-1.36 (0.17)
TAXR	0.64	0.64	0.62	0.65	0.61	-1.61(0.11)	0.62	0.64	0.63	0.64	0.61	**-1.63 (0.10)**
SDCF	0.65	0.66	0.66	0.61	0.57	**-5.29(0.00)**	0.62	0.63	0.64	0.63	0.62	0.85 (0.40)
LEV	0.66	0.65	0.64	0.60	0.62	**-2.54(0.01)**	0.65	0.63	0.62	0.63	0.61	**-2.56 (0.01)**
SIZE	0.60	0.60	0.62	0.66	0.68	**5.26(0.00)**	0.59	0.63	0.65	0.63	0.64	**6.03 (0.00)**

*Note: The Table presents mean allocation to pension assets invested in equity securities by quintiles formed every year based on independent variables. See Table 1 for variable definitions. Tests of differences between Quintile 5 and Quintile 1 (and corresponding *p*-values) are included.

Table 6

Changes in Pension Asset Allocation during the UK *Disclosure* period and the US *Partial Recognition* period*

	Obs.	Year 2001	Pre-Adoption Year	t-test 2001 vs. Pre-Adoption
Panel A: Portfolios based on current market values				
UK				
%Bond	154	24.5%	30.4%	**-3.26 (0.00)**
%Equity	154	66.5%	62.2%	**2.25 (0.03)**
US				
%Bond	252	32.0%	28.0%	**5.14 (0.00)**
%Equity	252	60.6%	65.1%	**-4.92 (0.00)**
Panel B: Portfolios based on index-adjusted market				
UK				
%Bond	154	22.0%	25.5%	**-2.22 (0.03)**
%Equity	154	69.1%	66.7%	1.26 (0.21)
US				
%Bond	252	29.0%	24.0%	**6.89 (0.00)**
%Equity	252	64.1%	71.6%	**-7.92 (0.00)**

*Note: The Table presents percentage of pension assets allocated to equity securities and bonds in year 2001 and the year prior to the adoption of full pension recognition (*FRS* 17 / *IAS* 19 in the UK and *SFAS* 158 in the US). Panel A presents results based on contemporaneous market values, whereas Panel B presents results based on market values that existed in year 2000. The *t*-tests (and corresponding *p*-values) are for the difference between allocation in pre-adoption year and allocation in 2001.

Table 7
Changes in Asset Allocation around the Year of Adopting Full Pension Recognition

Panel A: Portfolios based on current market values

UK	**Obs.**	**Year -2**	**Year -1**	**Year 0**	**Year +1**	**Year +2**	**t-test (-1, 0)**	**t-test (-2, 0)**	**t-test (-1, +1)**	**t-test (-2, +2)**
%Bond	216		29.5%	31.7%			**-2.26**			
							(0.02)			
%Equity	216		63.1%	61.1%			**3.37**			
							(0.00)			
%Bond	165		29.6%	31.7%	32.7%		**-2.06**		**-2.91**	
							(0.04)		**(0.00)**	
%Equity	165		63.5%	61.4%	59.0%		**3.29**		**5.41**	
							(0.00)		**(0.00)**	
%Bond	29	28.0%	30.3%	32.4%	35.8%	38.0%	-1.58	**-2.01**	**-3.72**	**-3.35**
							(0.12)	**(0.05)**	**(0.00)**	**(0.00)**
%Equity	29	65.7%	61.6%	59.4%	58.3%	55.4%	1.55	**2.68**	**2.24**	**3.90**
							(0.13)	**(0.01)**	**(0.03)**	**(0.00)**
US										
%Bond	322		28.5%	28.4%			**0.55**			
							(0.58)			
%Equity	322		64.8%	64.2%			**2.17**			
							(0.03)			
%Bond	208	28.4%	28.6%	28.5%			**0.36**	**-0.02**		
							(0.72)	**(0.99)**		
%Equity	208	62.0%	65.2%	64.6%			**2.07**	**-2.33**		
							(0.04)	**(0.02)**		

Panel B: Portfolios based on index-adjusted market values

UK	Obs.	Year -2	Year -1	Year 0	Year +1	Year +2	t-test (-1, 0)	t-test (-2, 0)	t-test (-1, +1)	t-test (-2, +2)
%Bond	216		24.6%	28.4%			**-5.16**			
							(0.00)			
%Equity	216		67.6%	63.4%			**6.67**			
							(0.00)			
%Bond	165		24.6%	28.1%	31.2%		**-4.45**		**-6.82**	
							(0.00)		**(0.00)**	
%Equity	165		68.3%	64.1%	60.1%		**6.32**		**9.70**	
							(0.00)		**(0.00)**	
%Bond	29	21.6%	23.2%	26.6%	31.3%	36.3%	**-3.00**	**-2.70**	**-6.38**	**-5.26**
							(0.01)	**(0.01)**	**(0.00)**	**(0.00)**
%Equity	29	73.2%	68.5%	64.1%	61.3%	56.4%	**3.02**	**3.22**	**4.66**	**5.47**
							(0.01)	**(0.00)**	**(0.00)**	**(0.00)**
US										
%Bond	322		24.4%	26.1%			**-7.88**			
							(0.00)			
%Equity	322		71.2%	67.4%			**16.6**			
							(0.00)			
%Bond	208	24.3%	24.4%	26.1%			**-6.68**	**-2.55**		
							(0.00)	**(0.00)**		
%Equity	208	68.3%	71.7%	67.9%			**13.33**	0.35		
							(0.00)	(0.73)		

Notes:

1. The Table presents percentage of pension assets allocated to equity securities and bonds around the adoption of full pension recognition in the UK and the US. Year 0 for UK companies is the year of adoption of *FRS* 17 or *IAS* 19. For US companies, year 0 is the year of adopting *SFAS* 158 (cut off date for adoption is 15 December 2006).
2. Panel A presents results based on contemporaneous market values, whereas Panel B presents results based on market values that existed in year 2000.
3. The sample size varies as data are only available up to December 2006. For US companies, year +1 will become available when December 2007 financial statements are issued. UK firms that elected the 10% corridor method under IAS 19 are excluded from our sample.
4. We report t-tests for pairs as the sample is kept constant. For UK companies we report three t-tests: for all companies with available data in years -1 and 0; companies with available data in years -1, 0, and +1; and companies with available data from year -2 through +2. For US companies we report two t-tests: for companies with data in years -1 and 0; and companies with available data in years -2, -1 and 0.

Table 8
Cross Sectional Analysis of the Change in Pension Assets Allocated in UK Companies to Equity Securities during the Disclosure of Pension Information under *FRS* 17

Panel A - Independent Variables are measured one year subsequent to adoption

Variable	Sign	Model 1	Model 2	Model 3	Model 4
ACTGL1	+	**0.12**			
		(2.21)**			
ACTGL2	+		**0.09**		
			(2.32)**		
EXPOS1	+			0.01	
				(0.46)	
EXPOS2	+				**0.01**
					(2.45)**
FUND	?	-0.58	-0.68	-0.61	-0.62
		(-0.69)	(-0.80)	(-0.71)	(-0.73)
FUND^2	?	0.14	0.19	0.14	0.15
		(0.33)	(0.45)	(0.32)	(0.35)
HOR	-	-0.03	-0.02	-0.03	-0.03
		(-0.86)	(-0.52)	(-0.79)	(-0.79)
DIVP	+	-0.07	-0.06	-0.07	-0.07
		(-0.28)	(-0.22)	(-0.30)	(-0.29)
TAXR	+	0.31	0.34	0.32	0.32
		(1.35)	(1.29)	(1.50)	(1.47)
FAGE	+	**0.03**	**0.03**	**0.03**	**0.03**
		(2.55)**	**(2.42)****	**(2.67)***	**(2.67)***
SDCF	+	**0.30**	**0.17**	**0.28**	**0.28**
		(3.42)*	**(3.71)***	**(5.60)***	**(6.22)***
LEV	+	0.02	0.03	0.02	0.02
		(0.52)	(0.54)	(0.41)	(0.45)
SIZE	-	-0.00	-0.00	-0.00	-0.00
		(-0.16)	(-0.91)	(-0.13)	(-0.12)
CLOSE	?	0.01	0.00	0.01	0.01
		(0.25)	(0.14)	(0.24)	(0.24)
Constant	?	**0.84**	**0.87**	**0.87**	**0.87**
		(2.40)**	**(2.70)***	**(2.71)***	**(2.68)***
Observations		145	145	145	145
Adj. R^2		0.21	0.26	0.21	0.21

Panel B - Independent Variables are measured as the change from fiscal 2000 (or 2001 if 2000 is missing) until one year prior to adoption

Variable	Sign	Model 1	Model 2	Model 3	Model 4
ACTGL1	+	**0.12**			
		(1.88)+			
ACTGL2	+		**0.08**		
			(5.25)*		
EXPOS1	+			**0.03**	
				(2.59)**	
EXPOS2	+				**0.02**
					(1.95)+
FUND	?	**0.83**	**0.84**	**0.69**	**0.73**
		(1.91)+	**(2.11)****	**(1.94)+**	**(2.07)****
FUND^2	?	**0.31**	**0.33**	**0.26**	**0.27**
		(1.94)+	**(2.03)****	**(2.02)****	**(2.16)****
HOR	-	**-0.10**	**-0.08**	**-0.10**	**-0.10**
		(-3.04)*	**(-2.77)***	**(-3.40)***	**(-3.20)***
DIVP	+	0.15	**0.16**	0.13	0.14
		(1.31)	**(1.72)+**	(1.22)	(1.26)
TAXR	+	0.14	0.16	0.12	0.12
		(0.83)	(0.94)	(0.83)	(0.82)
FAGE	+	0.04	0.05	0.04	0.04
		(0.89)	(1.29)	(1.08)	(1.04)
SDCF	+	0.03	0.15	0.04	0.04
		(0.12)	(0.83)	(0.21)	(0.21)
LEV	+	0.14	0.13	0.15	0.15
		(1.12)	(1.04)	(1.25)	(1.22)
SIZE	-	0.04	0.04	0.04	0.04
		(0.88)	(1.00)	(0.90)	(0.89)
CLOSE	?	**0.12**	**0.10**	**0.13**	**0.13**
		(1.75)+	**(1.14)**	**(1.72)+**	**(1.75)+**
Constant	?	0.00	0.02	0.00	0.00
		(0.04)	(0.54)	(0.03)	(0.01)
Observations		141	141	141	141
Adj. R^2		0.16	0.24	0.16	0.16

Notes:

1. The Table provides results for estimating Equations (2) in Panel A and Equation (2a) in Panel B for a sample of UK companies that sponsor defined benefit pension plans and for which financial and pension asset allocation data are available. The dependent variable in both panels is *rDISCLOSE*, which is the change in the percentage of assets allocated to equity securities from fiscal 2000 (or 2001 if fiscal 2000 is missing) until one year prior to adoption of *FRS* 17 or *IAS* 19, *rDISCLOSE* = *rEQUITY* (year 2000) - *rEQUITY* (Pre-Adoption year), where *rEQUITY* is the ratio of market value of pension assets allocated to equity securities divided by market value of total pension assets.

2. The models are:

$$rDISCLOSE_{it} = \beta_0 + \beta_1 PlanSize_{it} + \beta_2 FUND_{it} + \beta_3 FUND_{it}^2 + \beta_4 HOR_{it} + \beta_5 LEV_{it} + \beta_6 DIVP_{it} + \beta_7 TAXR_{it} + \beta_8 SDCF_{it} + \beta_9 SIZE_{it} + \beta_{10} FAGE_{it} + \beta_{11} CLOSE_{it} + \varepsilon_{it} \quad (2)$$

$$rDISCLOSE_{it} = \beta_0 + \beta_1 \Delta PlanSize_{it} + \beta_2 \Delta FUND_{it} + \beta_3 \Delta FUND_{it}^2 + \beta_4 \Delta HOR_{it} + \beta_5 \Delta LEV_{it} + \beta_6 \Delta DIVP_{it} + \beta_7 \Delta TAXR_{it} + \beta_8 \Delta SDCF_{it} + \beta_9 \Delta SIZE_{it} + \beta_{10} \Delta FAGE_{it} + \beta_{11} \Delta CLOSE_{it} + \varepsilon_{it} \quad (2a)$$

See Table 1 for variable definitions. All independent variables in Equation (2) are measured at year -1, the year prior to adoption of *FRS* 17 or *IAS* 19. In Equation (2a), independent variables are measured as the difference between year -1 and fiscal 2001.

3. All standard errors were computed using the Petersen (2006) methodology, which corrects for within company and over time correlations by clustering.

4. *, **, + indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 9
Cross Sectional Analysis of the Change in Pension Assets Allocated in US Companies to Equity Securities during the Partial Recognition Period under *SFAS* 87

Panel A - Independent Variables are measured one year subsequent to adoption

Variable	Sign	Model 1	Model 2	Model 3	Model 4
ACTGL1	+	**0.01**			
		(1.70)+			
ACTGL2	+		**0.01**		
			(1.64)+		
EXPOS1	+			0.01	
				(0.49)	
EXPOS2	+				0.01
					(0.70)
FUND	?	**-0.31**	0.09	**-0.33**	**-0.32**
		(-1.69)+	(0.37)	**(-2.15)****	**(-1.67)+**
FUND^2	?	**0.18**	**-0.02**	**0.19**	**0.18**
		(2.17)**	**(-0.18)**	**(2.61)****	**(2.20)****
HOR	-	-0.00	-0.02	-0.01	-0.01
		(-0.09)	(-0.69)	(-0.17)	(-0.24)
DIVP	+	**0.11**	**0.14**	**0.11**	**0.11**
		(5.87)*	**(8.64)***	**(2.79)***	**(6.67)***
TAXR	+	-0.05	-0.02	-0.03	-0.03
		(-0.33)	(-0.14)	(-0.20)	(-0.17)
FAGE	+	0.01	0.02	0.01	0.01
		(0.71)	(1.29)	(0.66)	(0.67)
SDCF	+	-0.00	0.03	-0.01	-0.02
		(-0.04)	(0.37)	(-0.11)	(-0.18)
LEV	+	0.03	0.01	0.03	0.03
		(0.30)	(0.12)	(0.31)	(0.31)
SIZE	-	-0.00	-0.00	0.00	0.00
		(-0.10)	(-0.97)	(0.01)	(0.06)
CLOSE	?	0.06	0.07	0.07	0.07
		(0.67)	(0.71)	(0.68)	(0.69)
Constant	?	0.09	-0.05	**0.10**	0.09
		(1.28)	(-0.62)	**(2.61)****	(1.36)
Observations		218	218	218	218
Adj. R^2		0.07	0.05	0.07	0.07

Panel B - Independent Variables are measured as the change from fiscal 2000 (or 2001 if 2000 is missing) until one year prior to adoption.

Variable	Sign	Model 1	Model 2	Model 3	Model 4
ACTGL1	+	0.01			
		(0.74)			
ACTGL2	+		**0.01**		
			(2.30)**		
EXPOS1	+			-0.01	
				(-0.87)	
EXPOS2	+				0.00
					(0.87)
FUND	?	-0.27	0.18	-0.28	-0.30
		(-1.01)	(1.24)	(-1.09)	(-1.07)
FUND^2	?	0.13	-0.07	0.13	0.14
		(1.19)	(-1.31)	(1.25)	(1.23)
HOR	-	**-0.12**	**-0.04**	**-0.11**	**-0.12**
		(-3.30)*	**(-7.78)***	**(-2.70)***	**(-3.25)***
DIVP	+	**0.08**	-0.00	**0.06**	**0.07**
		(3.39)*	(-0.01)	**(1.62)+**	**(2.57)****
TAXR	+	-0.13	-0.05	-0.12	-0.13
		(-0.57)	(-0.32)	(-0.54)	(-0.55)
FAGE	+	0.00	**-0.04**	-0.00	-0.01
		(0.08)	**(-4.38)***	(-0.12)	(-0.15)
SDCF	+	0.01	0.01	0.05	0.03
		(0.17)	(0.89)	(1.50)	(0.64)
LEV	+	0.06	-0.04	0.08	0.07
		(1.16)	(-0.59)	(1.12)	(1.05)
SIZE	-	**-0.03**	**-0.01**	**-0.04**	**-0.03**
		(-6.29)*	**(-3.10)***	**(-2.03)****	**(-2.76)***
CLOSE	?	0.08	0.10	0.08	0.08
		(0.50)	(1.07)	(0.56)	(0.53)
Constant	?	0.00	0.01	0.00	0.00
		(0.01)	(0.64)	(0.04)	(0.01)
Observations		215	215	215	215
Adj. R^2		0.08	0.07	0.08	0.08

Notes:

1. The Table provides results for estimating Equations (2) in Panel A and Equation (2a) in Panel B for a sample of US companies that sponsor defined benefit pension plans and for which financial and pension asset allocation data are available. The dependent variable in this table is *rDISCLOSE*, which is the change in the percentage of assets allocated to equity securities from fiscal 2000 (or 2001 if fiscal 2000 is missing) until one year prior to adoption of *SFAS* 158, *rDISCLOSE* = *rEQUITY* (year 2000) - *rEQUITY* (Pre-Adoption year), where *rEQUITY* is the ratio of market value of pension assets allocated to equity securities divided by market value of total pension assets.

2. The models are:

$$rDISCLOSE_{it} = \beta_0 + \beta_1 PlanSize_{it} + \beta_2 FUND_{it} + \beta_3 FUND_{it}^2 + \beta_4 HOR_{it} + \beta_5 LEV_{it} + \beta_6 DIVP_{it} + \beta_7 TAXR_{it} + \beta_8 SDCF_{it} + \beta_9 SIZE_{it} + \beta_{10} FAGE_{it} + \beta_{11} CLOSE_{it} + \varepsilon_{it} \quad (2)$$

$$rDISCLOSE_{it} = \beta_0 + \beta_1 \Delta PlanSize_{it} + \beta_2 \Delta FUND_{it} + \beta_3 \Delta FUND_{it}^2 + \beta_4 \Delta HOR_{it} + \beta_5 \Delta LEV_{it} + \beta_6 \Delta DIVP_{it} + \beta_7 \Delta TAXR_{it} + \beta_8 \Delta SDCF_{it} + \beta_9 \Delta SIZE_{it} + \beta_{10} \Delta FAGE_{it} + \beta_{11} \Delta CLOSE_{it} + \varepsilon_{it} \quad (2a)$$

See Table 1 for variable definitions. All independent variables in Equation (2) are measured at year -1, the year prior to adoption of *SFAS* 158. In Equation (2a), independent variables are measured as the difference between year -1 and fiscal 2001.

3. All standard errors were computed using the Petersen (2006) methodology, which corrects for within company and over time correlations by clustering.

4. *, **, + indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 10
Cross Sectional Analysis of the Change in Pension Assets Allocated in UK Companies to Equity Securities around the Adoption of *FRS* 17, *IAS* 19

Panel A - Independent Variables are measured one year subsequent to adoption

Variable	Sign	Model 1	Model 2	Model 3	Model 4
ACTGL1	+	**0.08**			
		(2.08)**			
ACTGL2	+		**0.02**		
			(2.46)**		
EXPOS1	+			**0.01**	
				(1.83)+	
EXPOS2	+				**0.01**
					(1.73)+
FUND	?	**-0.57**	**-0.57**	**-0.72**	**-0.70**
		(-2.21)**	**(-2.24)****	**(-2.40)****	**(-2.34)****
FUND^2	?	**0.22**	**0.21**	**0.28**	**0.27**
		(2.02)**	**(2.02)****	**(2.25)****	**(2.19)****
HOR	-	**-0.02**	**-0.02**	**-0.02**	**-0.02**
		(-2.35)**	**(-2.29)****	**(-2.33)****	**(-2.30)****
DIVP	+	**0.17**	0.16	**0.18**	**0.19**
		(1.69)+	(1.60)	**(2.00)****	**(2.00)****
TAXR	+	0.02	0.01	0.02	0.02
		(0.76)	(0.19)	(0.41)	(0.42)
FAGE	+	0.01	0.01	0.01	0.01
		(0.59)	(0.59)	(0.48)	(0.50)
SDCF	+	0.04	0.01	0.06	0.06
		(1.51)	(0.40)	(1.50)	(1.47)
LEV	+	0.05	0.04	0.04	0.04
		(0.86)	(0.74)	(0.86)	(0.85)
SIZE	-	-0.00	-0.00	-0.00	-0.00
		(-0.17)	(-0.13)	(-0.19)	(-0.19)
CLOSE	?	0.02	0.02	0.02	0.02
		(0.31)	(1.02)	(1.04)	(1.04)
Constant	?	**-0.45**	**-0.45**	**-0.53**	**-0.52**
		(-1.75)+	**(-1.76)+**	**(-2.02)****	**(-1.94)+**
Observations		150	150	150	150
Adjusted R^2		0.07	0.07	0.08	0.08

Panel B - Independent Variables are measured as the change from one year prior to adoption until one year subsequent to adoption

Variable	Sign	Model 1	Model 2	Model 3	Model 4
ACTGL1	+	**0.05**			
		(2.71)*			
ACTGL2	+		0.01		
			(0.67)		
EXPOS1	+			**0.01**	
				(2.39)**	
EXPOS2	+				**0.01**
					(2.51)**
FUND	?	**-0.89**	**0.91**	**0.94**	**0.94**
		(-4.29)*	**(3.67)***	**(6.83)***	**(6.05)***
FUND^2	?	**0.34**	**0.35**	**0.37**	**0.37**
		(3.89)*	**(3.27)***	**(7.06)***	**(6.39)***
HOR	-	**-0.03**	**0.03**	**0.03**	**0.03**
		(-1.73)+	**(1.72)+**	**(1.76)+**	**(1.76)+**
DIVP	+	0.02	0.03	0.02	0.02
		(0.70)	(0.65)	(0.65)	(0.60)
TAXR	+	**0.12**	**0.12**	**0.12**	**0.12**
		(5.29)*	**(5.38)***	**(5.39)***	**(4.98)***
FAGE	+	-0.02	0.02	0.02	0.01
		(-0.59)	(0.54)	(0.46)	(0.43)
SDCF	+	0.09	0.10	0.07	0.07
		(0.80)	(0.95)	(0.47)	(0.43)
LEV	+	**0.13**	**0.13**	**0.13**	**0.13**
		(1.87)+	**(2.09)****	**(2.01)****	**(2.03)****
SIZE	-	0.01	0.00	0.01	0.01
		(0.16)	(0.10)	(0.20)	(0.24)
CLOSE	?	0.02	0.01	0.01	0.01
		(0.78)	(0.66)	(0.60)	(0.61)
Constant	?	0.01	0.01	0.01	0.01
		(0.74)	(0.64)	(0.70)	(0.76)
Observations		148	148	148	148
Adj. R^2		0.14	0.15	0.15	0.15

Notes:

1. The Table provides results for estimating Equation (3) in Panel A and Equation (3a) in Panel B using a sample of UK companies that sponsor defined benefit pension plans and for which financial and pension asset allocation data are available. The dependent variable in this table is *rADOPT*, which is the change in the percentage of assets allocated to equity securities from one year prior to adoption of *FRS* 17 or *IAS* 19 until one year subsequent to adoption *rADOPT* = *rEQUITY* (Pre-Adoption Year) - *rEQUITY* (Post-Adoption Year), where *rEQUITY* is the ratio of market value of pension assets allocated to equity securities divided by market value of total pension assets.

2. The model is specified as below

$$rADOPT_{it} = \beta_0 + \beta_1 PlanSize_{it} + \beta_2 FUND_{it} + \beta_3 FUND_{it}^2 + \beta_4 HOR_{it} + \beta_5 LEV_{it} + \beta_6 DIVP_{it} + \beta_7 TAXR_{it} + \beta_8 SDCF_{it} + \beta_9 SIZE_{it} + \beta_{10} FAGE_{it} + \beta_{11} CLOSE_{it} + \varepsilon_{it} \quad (3)$$

$$rADOPT_{it} = \beta_0 + \beta_1 \Delta PlanSize_{it} + \beta_2 \Delta FUND_{it} + \beta_3 \Delta FUND_{it}^2 + \beta_4 \Delta HOR_{it} + \beta_5 \Delta LEV_{it} + \beta_6 \Delta DIVP_{it} + \beta_7 \Delta TAXR_{it} + \beta_8 \Delta SDCF_{it} + \beta_9 \Delta SIZE_{it} + \beta_{10} \Delta FAGE_{it} + \beta_{11} \Delta CLOSE_{it} + \varepsilon_{it} \quad (3a)$$

See Table 1 for variable definitions. All independent variables in Equation (3) are measured at the Post-Adoption year, the year subsequent the adoption of *FRS* 17 or *IAS* 19. Independent variables in Equation (3a) are measured as the difference between the post-adoption and pre-adoption years.

3. All standard errors were computed using the Petersen (2006) methodology, which corrects for within company and over time correlations by clustering.

4. *, **, + indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 11
Cross Sectional Analysis of the Change in Pension Assets Allocated in US companies to Equity Securities around the Adoption of Full Recognition Accounting US (*SFAS* 158)

Panel A - Independent Variables are measured at the year of adoption

Variable	Sign	Model 1	Model 2	Model 3	Model 4
ACTGL1	+	**0.03**			
		(13.97)*			
ACTGL2	+		**0.02**		
			(11.79)*		
EXPOS1	+			**0.03**	
				(4.57)*	
EXPOS2	+				**0.03**
					(3.95)*
FUND	?	0.18	**0.16**	0.01	0.05
		(1.60)	**(1.65)+**	(0.08)	(0.49)
FUND^2	?	-0.07	-0.06	0.00	-0.01
		(-1.30)	(-1.28)	(0.00)	(-0.26)
HOR	-	**-0.03**	**-0.03**	**-0.04**	**-0.04**
		(-1.80)+	**(-2.04)****	**(-2.04)****	**(-1.98)+**
DIVP	+	0.05	0.05	0.04	0.04
		(0.48)	(0.55)	(0.32)	(0.30)
TAXR	+	**0.18**	**0.18**	**0.15**	**0.15**
		(5.78)*	**(7.64)***	**(5.09)***	**(5.27)***
FAGE	+	0.00	0.00	0.00	0.00
		(0.60)	(0.52)	(0.47)	(0.69)
SDCF	+	-0.09	-0.10	-0.17	-0.17
		(-0.62)	(-0.64)	(-0.88)	(-0.85)
LEV	+	**0.03**	**0.03**	**0.02**	**0.02**
		(2.78)*	**(2.96)***	**(3.88)***	**(4.02)***
SIZE	-	-0.01	-0.01	-0.00	-0.00
		(-1.39)	(-1.39)	(-0.61)	(-0.49)
CLOSE	?	**0.01**	**0.01**	**0.01**	**0.01**
		(3.19)*	**(3.32)***	**(3.70)***	**(3.74)***
Constant	?	0.06	**0.07**	**0.16**	**0.12**
		(1.50)	**(2.16)****	**(2.39)****	**(2.06)****
Observations		234	234	234	234
Adj. R^2		0.04	0.04	0.05	0.05

Panel B - Independent Variables are measured as the change from the pre-adoption year to the year of adoption

Variable	Sign	Model 1	Model 2	Model 3	Model 4
ACTGL1	+	**0.04**			
		(2.78)*			
ACTGL2	+		**0.03**		
			(2.07)**		
EXPOS1	+			-0.01	
				(0.67)	
EXPOS2	+				-0.02
					(1.06)
FUND	?	-0.45	-0.07	-0.50	-0.54
		(-0.75)	(-0.15)	(-0.92)	(-1.08)
FUND^2	?	0.26	0.04	0.28	0.29
		(1.28)	(0.21)	(1.55)	(1.76)+
HOR	-	-0.01	**-0.05**	-0.02	-0.02
		(-0.56)	**(-2.52)****	(-0.67)	(-0.77)
DIVP	+	0.03	-0.02	**0.05**	**0.06**
		(0.78)	(-0.76)	**(3.85)***	**(7.49)***
TAXR	+	0.00	-0.08	0.06	**0.06**
		(0.57)	(-1.20)	(1.46)	**(1.64)**+
FAGE	+	-0.31	-0.08	-0.30	-0.31
		(-0.80)	(-0.30)	(-0.73)	(-0.76)
SDCF	+	0.01	0.06	**0.02**	**0.04**
		(0.12)	(1.00)	**(3.15)***	**(4.27)***
LEV	+	**0.31**	**0.18**	**0.33**	**0.33**
		(3.51)*	**(1.92)***	**(5.71)***	**(6.37)***
SIZE	-	-0.02	-0.02	**-0.02**	**-0.02**
		(-1.31)	(-1.88)+	**(-2.14)****	**(-2.11)****
CLOSE	?	**0.01**	0.01	**0.01**	**0.01**
		(2.21)**	(0.16)	**(3.20)***	**(3.19)***
Constant	?	**-0.01**	**-0.01**	**-0.01**	**-0.01**
		(-7.38)*	**(-6.56)***	**(-4.93)***	**(-4.17)***
Observations		232	232	232	232
Adj. R^2		0.09	0.05	0.08	0.08

Notes:

1. The Table provides results for estimating Equation (3) in Panel A and Equation (3a) in Panel B using a sample of US companies that sponsor defined benefit pension plans and for which financial and pension asset allocation data are available. The dependent variable in this table is *rADOPT*, which is the change in the percentage of assets allocated to equity securities from one year prior to adoption of SFAS 158 until the year of adoption *rADOPT* = *rEQUITY* (Pre-Adoption Year) - *rEQUITY* (Adoption Year), where *rEQUITY* is the ratio of market value of pension assets allocated to equity securities divided by market value of total pension assets.

2. The models are:

$$rADOPT_{it} = \beta_0 + \beta_1 PlanSize_{it} + \beta_2 FUND_{it} + \beta_3 FUND_{it}^2 + \beta_4 HOR_{it} + \beta_5 LEV_{it} + \beta_6 DIVP_{it} + \beta_7 TAXR_{it} + \beta_8 SDCF_{it} + \beta_9 SIZE_{it} + \beta_{10} FAGE_{it} + \beta_{11} CLOSE_{it} + \varepsilon_{it} \quad (3)$$

$$rADOPT_{it} = \beta_0 + \beta_1 \Delta PlanSize_{it} + \beta_2 \Delta FUND_{it} + \beta_3 \Delta FUND_{it}^2 + \beta_4 \Delta HOR_{it} + \beta_5 \Delta LEV_{it} + \beta_6 \Delta DIVP_{it} + \beta_7 \Delta TAXR_{it} + \beta_8 \Delta SDCF_{it} + \beta_9 \Delta SIZE_{it} + \beta_{10} \Delta FAGE_{it} + \beta_{11} \Delta CLOSE_{it} + \varepsilon_{it} \quad (3a)$$

See Table 1 for variable definitions. All independent variables in Equation (3) are measured at the adoption year of *SFAS* 158. Independent variables in Equation (3a) are measured as the difference between the pre-adoption year and the adoption year.

5. All standard errors were computed using the Petersen (2006) methodology, which corrects for within company and over time correlations by clustering.

6. *, **, + indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Appendix 1: Roadmap towards *FRS* 17

	Standards/Drafts/Amendments	Notes
1988, *ASC*	*SSAP* 24, "Accounting for Pension Cost"	*SSAP* 24 was published by the Accounting Standards Board's predecessor body, Accounting Standards Committee (ASC).
Nov 1999,*ASB*	*FRED* 20, "Retirement Benefits"	Financial Reporting Exposure Draft (*FRED*) 20 proposes a change from using actuarial values for pension assets/liabilities to a market value based approach.
Nov 2000,ASB	*FRS* 17, "Retirement Benefits"	*FRS* 17 requires mandatory implementation for accounting periods ending on or after 22 June 2003. Earlier adoption is encouraged. Disclosure in accordance with *FRS* 17 is required during the transitional period (between 22.6.01 and 22.6.03).
Jul 2002,ASB	Exposure Draft of an amendment to *FRS* 17 for an extended transitional regime	ASB proposes an extended transitional period for *FRS* 17 during the period of international discussions on IAS 19.
Nov 2002,ASB	An amendment to *FRS* 17 to extend the transitional arrangements	The requirements of *FRS* 17 as amended will become mandatory for accounting periods beginning on or after 1 January 2005.
Apr 2004, IASB*	Exposure draft, "Proposed Amendments to IAS 19, Employee Benefits: Actuarial gains/losses, Group Plans and Disclosures"	IASB proposes immediate recognition of actuarial gains/losses in a similar manner to that required by *FRS* 17.
Dec 2004, IASB*	Amendments to IAS19, "Employee Benefits"	Introducing an alternative treatment that allows companies to recognize full actuarial gains/losses in a new statement titled "the statement of recognized income and expense."
Dec 2005, ASB	Research project into accounting for pensions	It will reconsider the principles of pensions accounting due to regulatory changes after the publication of *FRS* 17.
May 2005, ASB	Exposure Draft on Pension Disclosures	It proposes an amendment to *FRS* 17, suggesting replacing the disclosures required by *FRS* 17 with those of IAS 19.

* Recent amendments to IAS 19 are included, as these were considered by ASB in the process of revising *FRS* 17.

Appendix 2: A Comparison of Major Pension Accounting Standards

	***FRS* 17**	***SSAP* 24**	***SFAS* 87**	***SFAS 158***	***IAS* 19**
Valuation of Pension Asset	Market value	Actuarial basis	Market value	Market value	Market value
Discount Rate for the Valuation of Pension Liability	Return on AA corporate bonds	Long-term actuarial assumptions	Long-term actuarial assumptions but possible to use the rate on AA corporate bonds	Long-term actuarial assumptions but possible to use the rate on AA corporate bonds	Return on AA corporate bonds
Actuarial Gains/Losses	Recognized immediately in the statement of total recognized gains and losses (comprehensive income)	Amortized and spread forward over a number of years and recognized through the profit and loss account	Deferred and amortized over employee average remaining service life, subject to corridor method. Amortization is included in periodic pension cost (P&L)	Recognized immediately in comprehensive income	Choice between amortizing gains and losses based on the corridor method, or immediate recognition in the statement of recognised income and expenses (comprehensive income).
Surplus/Deficit in the Pension Fund	Recognized as an asset or a liability on the balance sheet	Disclosed in the notes	Disclosed in the notes; Unfunded ABO is recognized on the balance sheet as additional minimum liability (against intangible pension asset or shareholders' equity)	Recognized as an asset or a liability on the balance sheet	Recognized based on the corridor method in case actual gains and losses are deferred and amortized or fully recognized in case actuarial gains/losses and past service costs are fully recognized in shareholders' equity.