

Pension plans assumptions: the case of discount rate

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Abstract

Purpose – In 2009, the International Accounting Standards Board started revising International Accounting Standard (IAS) 19 to improve the requirements for managing the annual expense of a pension plan. The revised standard became effective in 2013. The purpose of this paper is to investigate what effect this revision had on managerial discretion. The paper also examines the implications of the revision on the value relevance of accounting information.

Design/methodology/approach – The authors use a sample of 72 firms listed on the FTSE 100 that have defined benefit plans for the period between 2009 and 2015. The authors use a regression discontinuity design to analyse the effect from the revision of IAS 19 on the choice of managers regarding the expected rate of return-on-plan assets. The paper also investigates whether firms with higher pension sensitivity are more likely to manage earnings upward before the revision of IAS 19. Further, the paper studies the value relevance of earnings after the revision of the accounting standard.

Findings – Consistent with predictions, the results show that the adoption of the revised IAS 19 limits the use of the expected rate of return on assets to manage the annual expense of defined benefit plans. This finding shows a sharp increase in the value relevance of earnings.

Practical implications – This finding is useful for users and preparers of financial statements and regulatory bodies as it identifies not only the influence of a change in the accounting standard for earnings management but also provides evidence on the consequences of managers' discretion.

Originality/value – This paper provides direct evidence on the relationship between regulation and financial reporting discretion. It also provides evidence to accounting standard setters that the revision of IAS 19 improves the value relevance of financial information, which gives additional justification to the changes introduced by regulators.

Keywords Managerial discretion, Value relevance, Discount rate, International accounting standard, Defined benefit plans, IAS 19

Paper type Research paper

1. Introduction

The accounting for defined benefit plans is an important financial reporting issue as it is complex and involves a substantial degree of managerial discretion in formulating actuarial assumptions (Glaum *et al.*, 2018). Publicly listed European firms are required to prepare consolidated financial statements under the standards of the International Accounting Standards Board (IASB). Further, the International Accounting Standard (IAS) 19 for employee benefits identifies the accounting requirements for defined benefit plans.

Both users and preparers of financial statements have criticised the accounting requirements of IAS 19 IASB. (1998) for failing to provide high-quality and transparent information about the promises of post-employment benefits (IASB, 2008). Therefore, in



2009, the IASB started revising IAS 19 [IASB. \(2011\)](#) with the aim to increase transparency and comparability between IFRS reporters and to enhance the information that entities provide about their promises on defined benefit plans. The revision was to be effective on or after 2013.

The revision introduced two major changes to the accounting options available under IAS 19. Originally under IAS 19 [IASB. \(1998\)](#), firms could recognize actuarial gains and losses immediately through other comprehensive income OCI or in a deferred way through profit and loss (i.e. the corridor approach). The revised IAS 19 requires firms to report actuarial gains and losses only in the OCI. This change could be significant for those entities that had applied the corridor approach ([Ernst and Young, 2011](#)).

The second significant change is related to the calculation of the net interest on defined benefit plans. The revision replaces the expected rate of return-on-plan assets with the net interest cost on the net pension liability or asset. Until 2013, IAS 19 required the firms to estimate a discount rate and an expected rate of return (ERR) on plan assets to compute the interest cost and expected return-on-plan assets. The revised IAS 19 replaces these two items with the net interest cost by applying the same discount rate to the difference between the defined benefit obligation and the fair value of plan assets. The discount rate continues to be based on the yield on high-quality corporate bonds or on government debt when there is no deep market in high-quality corporate bonds. As the discount rate is typically lower than the ERR, firms expect an increase in the income statement expenses.

Therefore, since 2013, there is no connection between the assets held by a pension scheme and the return on assets that are recognised in the profit or loss. The difference between the return-on-plan assets and the amount that is included in net interest on the net defined benefit liability (asset) is defined as the re-measurement component and is included in the OCI. With the elimination of the expected return approach, the IASB aimed to simplify the reporting of changes in defined benefit plans and to give a better representation of the economics of the net defined benefit asset or liability. However, the literature concludes that changes in accounting policy lead to a reduction in the use of discretion in pension assumptions that play a fundamental role in controlling the opportunism in financial reporting ([Naughton, 2015](#); [An et al., 2014](#); [Bergstresser et al., 2006](#)). However, critics of the net interest approach state that deficits (net pension liability) and surpluses (net pension assets) have different economic drivers, and therefore, should be measured on a different basis ([Chircop and Kiosse, 2015](#)). In this paper, we aim to analyse the impact from the abolition of the ERR and the introduction of the “net interest approach”. We investigate this change for several reasons. First, considering the complexity of accounting for defined benefits plans, previous studies have shown that managers use accounting flexibility to manage pension estimates, such as the discount rate or the ERR. They manage earnings to meet or exceed thresholds or analysts’ forecasts before acquisitions by other firms ([An et al., 2014](#); [Bergstresser and Philippon, 2006](#); [Comprix and Muller, 2006](#); [Naughton, 2015](#)). Second, this change is not perceived in the same way by preparers and regulators. While preparers consider the use of the discount rate on the plan assets as an inadequate representation of the circumstances ([Svensk Näringsliv, 2010](#)), regulators seem to agree that the use of the ERR should be avoided ([CEBS, 2010](#)). The IASB also admits the limitation of the net interest approach, but considers this approach to be practical and to reduce subjective judgements. Finally, most UK companies had already recognised actuarial gains and losses in the OCI by 2005[1] ([Glaum et al., 2018](#)). Therefore, between the two major changes to the accounting options available under IAS 19, the one related to the recognition of actuarial gains and losses should not have a significant impact on the financial reporting in our sample.

The objective of this paper is twofold. First, it aims to investigate whether the revision of IAS 19 regarding the measurement of the annual expense of a defined benefit plan that is recognised in the profit or loss leads to a reduction in opportunistic reporting regarding pension assumptions. Second, this study also investigates whether such an accounting change has any consequences on the quality of financial reporting and consequently in the value relevance of earnings.

This study extends the literature in two ways. [Naughton \(2015\)](#) analyses the impact of a warning by the SEC that it would investigate certain pension assumptions and the implementation of additional disclosure requirements for pension assumptions on managers' discretion. Our study is different because it examines a significant change in the measurement of the expenses for employee benefit with an impact on the profit and loss statement. Further, this study also provides evidence of the impact of such accounting changes on the value relevance of financial reporting.

Our sample consists of 72 European listed firms on the FTSE 100 in 2015 that had adopted the IFRS and had disclosed information on their defined benefits plans, such as the discount rate, return-on-plan assets, present value of the defined benefit obligation and fair value of plan assets.

Consistent with predictions, the results show that the adoption of the revised IAS 19 limits the use of the ERR to manage the annual expense of defined benefit plans. The results also show a discontinuity in the return-on-plan assets in 2013 as represented by a sharp decline. We observe an increase in the net interest cost recognised in profit, with a positive impact on the quality of financial reporting and an increase in the value relevance of earnings.

The contribution of this paper is threefold. First, it adds to the literature that shows that pension plan assumptions are used to manage earnings ([An et al., 2014](#); [Naughton, 2015](#); [Bergstresser and Philippon, 2006](#); [Comprix and Mukler, 2006](#)). The results show that firms manage earnings more when they can estimate the ERR on plan assets.

Second, this paper is also of interest to the ongoing standard-setting debate about discount rates, as it provides justification for the use of the discount rate in determining the net interest on a defined benefits plan. Specifically, the paper examines whether a change in a mandatory accounting standard influences a manager's use of discretion in pension assumptions to manage reported earnings. The results show that the revised IAS 19 limits the use of the EER on plan assets to manage earnings. So, the paper provides direct evidence of the relation between regulation and financial reporting discretion.

Finally, this study also contributes to the literature that investigates the impact from eliminating accounting assumptions on the quality of financial reporting. The results show a sharp increase in the value relevance of earnings after the revision of IAS 19 that indicates the net interest approach increases the quality of financial information. These findings are useful for users and preparers of financial statements as they show not only the influence of accounting standards on earnings management but also provide evidence of the consequences of managers' discretion.

The paper is organized as follows: Section 2 reviews the relevant literature and provides a description of the hypotheses; Section 3 presents the research design; Section 4 describes the sample and its statistics; and the empirical results are discussed in Section 5. The conclusions are presented in the Section 6.

2. Previous studies and hypotheses

Previous studies show that managers tend to manage earnings by using assumptions about pension plans ([An et al., 2014](#); [Bergstresser and Philippon, 2006](#); [Comprix and Muller, 2006](#);

Naughton, 2015). However, the market does not correctly price the information disclosed about defined benefit plans (Coronado and Sharpe, 2003; Picconi, 2006). Comprix and Muller (2006) find that managers increase the ERR to overstate pension income because the CEOs' cash compensation is sensitive to pension income. Bergstresser *et al.* (2006) also find that the ERR is opportunistically estimated by managers. Firms tend to use a higher ERR when they prepare to acquire other firms, when they are near critical earnings thresholds or when they exercise stock options. An *et al.* (2014) show that firms manage the ERR on defined benefits plans' assets to meet or beat analysts' forecasts.

The literature provides evidence of the different incentives that lead to earnings management through the assumptions on defined benefits plans. Lew (2009) investigates whether financially distressed firms exploit actuarial assumptions and finds that their managers tend to smooth earnings by changing the pension rates and cash contributions to the plan.

Godwin *et al.* (1996) give evidence that managers increase the discount rate in response to a decline in earnings, a tightening of debt covenants and to dividend constraints. Brown (2006) investigates the managerial discretion in selecting actuarial assumptions to calculate pension obligations and concludes that managers of firms with a funding deficit opt for pensions assumptions that reduce their pension obligations.

However, Adams *et al.* (2011) do not find any inflation in income from the ERR before 2005, but they do find that for some firms, small increases in the ERR on plan assets can have a material impact on reported earnings. Similarly, Doyle (2016) finds no evidence of earnings management through the choice of the ERR on plan assets after introducing fixed effects to control for unobserved heterogeneity in the firms. She finds that firms tend to infrequently change the ERR and that the variation in the ERR on plan assets is essentially explained by the pension fund's size.

Naughton (2015) investigates whether regulatory oversight influences managers' discretion when estimating pension assumptions to manage earnings. He finds that managers not only reduce the use of discretion in those areas "under the attention" of regulatory oversight but also increase the use of discretion in other areas.

In line with Naughton (2015), we also analyse the impact of oversight changes in accounting standards on earnings management for defined benefits plans. Nevertheless, while Naughton (2015) analyses the influence of additional disclosure requirements for pension assumptions on earnings management, we study a change in the IAS 19 that has a direct impact on the calculation of interest income from plan assets in the income statement. Additionally, we also examine the impact of such a regulatory change on the value relevance of earnings.

Therefore, we state the following hypothesis:

- H1.* The adoption of the revised IAS 19 constrains managerial discretion in estimating the assumptions about a defined benefit plan.

The restriction of the use of the ERR to limit discretion allows for an increase in the quality of reporting that, therefore, should increase the value relevance of accounting information. As we predict few earnings after the revision of IAS 19, we predict an increase in the value relevance of earnings (Whelan and McNamara, 2004). Hence, we state the following hypothesis:

- H2.* The value relevance of accounting information increases after the adoption of the revised IAS 19.

3. Research design

To estimate the level of discretion used in setting pension assumptions, we compute the variable discretionary return-on-plan asset (DRPA) as the difference between a firm's choice regarding the return-on-plan assets and the risk-free rate (UK government 10-year bonds). We predict higher values for the DRPA before the adoption of the revised IAS 19 because it was easier to manage the ERR to reduce the amount of the annual expenses.

Through a regression discontinuity design, we investigate the effect of the revision of IAS 19 on the variable DRPA (Lee and Lemieux, 2010). According to Calonico *et al.* (2014), the regression discontinuity design is one of the best quasi-experimental research designs for the estimation and inference of treatment effects. The revision of IAS 19 in 2013 should cause a discontinuity in the managers' choice of return-on-plan assets. Therefore, we consider the following model (Lemieux and Milligan, 2008):

$$DRPA = \beta_0 + \beta_1 POST_{REVIAS} + PASSETS + IND + \varepsilon \quad (1)$$

where DRPA is the outcome variable for firm i in year t and the assignment variable is $POSTREVIAS$ that captures the change in the choice of return-on-plan assets due to the adoption of the revised IAS 19. It is defined as:

$$POST_{REVIAS} = \begin{cases} 0 & \text{if } t < 2013 \\ 1 & \text{if } t \geq 2013 \end{cases} \quad (2)$$

$PASSETS$ is the natural logarithm of total pension assets and IND is the industry dummies. We do not include in our analysis the impact of the change introduced by the revised IAS 19 regarding the option for the recognition of actuarial gains and losses. The reason is that about 95 per cent of our sample had already adopted the recognition of actuarial gains and losses in the OCI in 2009.

Next, we estimate the model presented by Bergstresser *et al.* (2006) to investigate if there is evidence of a decrease in earnings management through pension assumptions after the revision of IAS 19. Bergstresser *et al.* (2006) develop different measures of the sensitivity of a firm's reported profits to the estimated return on pension assets that managers set. The authors argue that firms with higher pension sensitivity choose higher ERR values, which means that managers manage earnings upward (Doyle, 2017):

$$DRPA = \alpha + \beta_1 PENSENS + \beta_2 PENSENS * POST_{REVIAS_{it}} + \beta_3 PASSETS + \varepsilon \quad (3)$$

where $PENSENS$ is a measure of pension sensitivity and the incentive to manage the ERR on plan assets. It is computed as the log ratio of plan assets to operating earnings. $H1$ predicts a positive β_1 . If the revision of IAS 19 leads to a decrease in the level of earnings management, β_2 should be negative. $POSTREVIAS$ is a dummy variable that equals one for the period following the implementation of the revised IAS 19 (2013-2015) and zero for the period before the revision (2009-2012).

To analyse $H2$, we estimate a linear price-level model (Ohlson, 1995; Easton, 1999; Hassel *et al.*, 2005). We separately add the pension effect on income from the earnings per share (EPS) to examine if there is an increase in the value relevance of earnings after the revision of IAS 19:

$$\begin{aligned}
MVE_i = & \alpha + \beta_1 BVS + \beta_2 BVS * POST_{REVIAS} + \beta_3 EPS_{REV} + \beta_4 EPS_{REV} * POST_{REVIAS} \\
& + \beta_5 NETINTEREST + \beta_6 NETINTEREST * POST_{REVIAS} \\
& + \beta_7 DLOSS + \beta_8 ASSETS + \beta_9 LEV + \beta_{10} ROE + \beta_{11} IND + \varepsilon
\end{aligned} \tag{4}$$

where MVE_i is the market value of equity four months after the fiscal year-end divided by the number of common shares, BVS is the book value of equity scaled by the number of common shares and EPS_{REV} is the EBIT plus interest cost of pension plans minus their interest income. $POST_{REVIAS}$ is a dummy variable that equals one for the period following the implementation of the revised IAS (2013-2015) and zero for the period before the revision of IAS 19 (2009-2012) and $NETINTEREST$ is the interest income minus the interest cost of pension plans. $DLOSS$ is a dummy variable that equals one if EPS_{REV} is negative and zero otherwise, $ASSETS$ is the natural logarithm of total assets and LEV is the firm's leverage that is computed as the total liabilities divided by the total assets. ROE is the EBIT divided by the book value of equity and the IND is the industry dummies. We predict a positive coefficient for β_6 because there should be an increase in the value relevance of earnings after the revision of IAS 19 due to the higher quality of financial reporting.

4. Sample and data

We use a sample of FTSE 100 firms that had defined benefit plans and had adopted IAS 19 over the period from 2009 to 2015. We chose this index as it included the largest firms in the UK that had defined benefit plans as a significant weight in their financial reporting. Our final sample comprises 72 firms with information on their defined benefit plans.

We hand-collected information about the discount rate, the interest cost, the return-on-plan assets, the net defined benefit asset or liability and the net interest cost. The firm-level characteristics such as market value; total assets; capex; cash flow from operations; property, plant and equipment; and revenues were obtained from Datastream for the same period.

Panel A of [Table I](#) reports the summary statistics of the variables. The mean firm in our sample has total assets of GBP 62bn as our sample includes large UK firms. The mean annual return-on-plan assets are 5 per cent with a standard deviation of 1 per cent. Before 2013, this variable represents the ERR on plan assets fixed by firms, while in subsequent periods the return-on-plan assets are the estimated discount rate. The mean of the variable $NETINTEREST$ (interest income per share minus the interest cost per share of pension plans) is negative and presents a low value of -0.003 .

Panel B of [Table I](#) shows the Pearson correlations between the variables. The higher correlation value is 0.60 between BVS and MVE . The other correlation values are low, which indicates that there is no multicollinearity in our tests.

[Figure 1](#) graphs the return-on-plan assets and the DRPA by year and shows a decline in both variables after 2013. This decline indicates that the revision of IAS 19 affected the firm's valuation and managerial discretion.

[Table II](#) shows the pattern of increases and decreases in the return-on-plan assets and the DRPA over the sample period. We observe that before the revision of IAS 19, there are large increases in DRPA (62.5 per cent in 2011 and 93.8 per cent in 2012) with positive means in both years (0.08 per cent in 2011 and 0.71 per cent in 2012). However, the results show that after the revision of IAS 19, there is a sharp reduction in the number of DRPA increases (6.5 per cent in 2013), with the mean at -1.59 per cent.

	Mean	Median	SD	Min	Max		
<i>Panel A: Descriptive statistics</i>							
<i>RPA</i>	0.05	0.05	0.01	0.01	0.13		
<i>DRPA</i>	0.02	0.02	0.01	-0.01	0.09		
<i>ASSETS</i> (£m)	62,100	11,000	166,000	214	990,000		
<i>MVE</i>	10.42	7.69	8.36	0.97	34.8		
<i>BVS</i>	4.020	2.720	3.35	0.31	14.55		
<i>EPS_{REV}</i>	1.12	0.75	1.54	-5.98	10.73		
<i>NETINTEREST</i>	-0.003	-0.001	0.05	-0.16	0.33		
<i>LEV</i>	0.69	0.70	0.18	0.27	0.97		
<i>ROE</i>	0.26	0.24	0.18	-0.22	0.91		
<i>Panel B: Correlation matrix</i>							
<i>MVE</i>	1.00						
<i>BVS</i>	0.52	1.00					
<i>EPS_{REV}</i>	0.60	0.45	1.00				
<i>NETINTEREST</i>	-0.20	-0.27	-0.08	1.00			
<i>ASSETS</i>	-0.02	0.16	0.06	-0.05	1.00		
<i>LEV</i>	-0.09	-0.23	-0.10	0.05	0.37	1.00	
<i>ROE</i>	0.19	-0.21	0.32	0.11	-0.28	0.20	1.00

Notes: This table presents the statistics and Pearson correlations for the firm-level variables. The variable *RPA* is the return-on-plan assets computed as the ratio between interest income and the fair value of pension plan assets at the beginning of the year. For the period from 2009 to 2012, *RPA* represents the expected return-on-plan assets estimated by the firm for each year. For periods beginning on or after 1 January 2013, after the revision of IAS19, *RPA* is the discount rate that is estimated for the firm to compute the interest costs of the defined benefit plans. *DRPA* is computed as the difference between *RPA* and the risk-free interest rate (UK Government 10-year bonds). *MVE* is the market value of equity four months after the fiscal year-end divided by the number of common shares; *BVS* is the book value of equity that is scaled by the number of common shares; *EPS_{REV}* is the EBIT plus the interest cost of pension plans minus the interest income of pension plans. *NETINTEREST* is interest income per share minus the interest cost per share of pension plans. *ASSETS* is the natural logarithm of total assets; *LEV* is the firm's leverage that is computed as the total liabilities divided by total assets. *ROE* is computed as EBIT divided by the book value of equity

Table I.
Descriptive statistics
and correlation
matrix

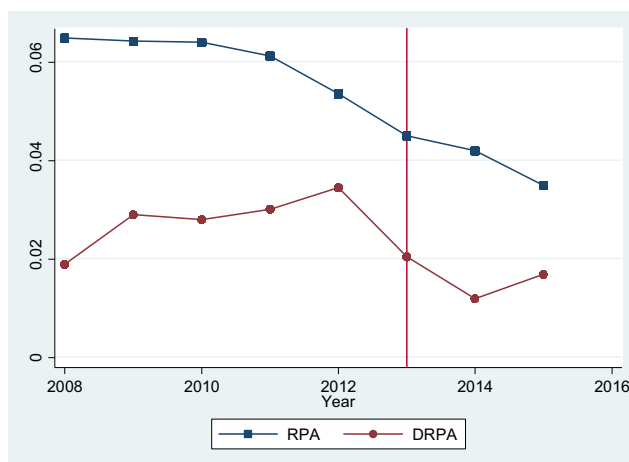
5. Empirical results and return-on-plan assets

5.1 Univariate tests

Next, we present some univariate tests to test the hypothesis that the adoption of the revised IAS19 led to the reduction of managerial discretion regarding pension assumptions.

Table III shows the univariate analysis of the return-on-plan assets pooled across the years between 2009 and 2015. Before 2013, the return-on-plan assets represent the ERR for a firm in each year. In this period, this assumption is subject to greater discretion than in the subsequent periods as the revised IAS 19 required that beginning on or after 1 January 2013, firms must use the estimated discount rate to compute the interest income on pension plans. Therefore, we observe a decrease in the mean of the return-on-plan assets from 6.1 per cent to 4.1 per cent after the revised IAS 19 that is statistically significant at the 1 per cent level.

To control for the evolution of the risk-free rate, we estimate *DRPA* as the difference between the return-on-plan assets and the risk-free rate (UK Government 10-year bonds). We also observe a decrease of *DRPA* after the implementation of the revised IAS 19 from 2.9 per cent to 1.6 per cent that is statistically significant at the 1 per cent level.



Sources: The variable RPA is the return-on-plan assets that is computed as the ratio between interest income and the fair value of pension plan assets at the beginning of the year. For the period from 2009 to 2012, RPA represents the expected return-on-plan assets that is estimated for the firm in each year. For periods beginning on or after 1 January 2013, after the revision of IAS19, RPA is the discount rate that is estimated for the firm to compute interest costs with defined benefit plans. DRPA is computed as the difference between RPA and the risk-free interest rate

Figure 1.
RPA and DRPA by year

	Mean change RPA	Mean change DRPA	% Firms increasing RPA	% Firms increasing DRPA	% Firms decreasing RPA	% Firms decreasing DRPA
2010	-0.02	-0.09	50.0	50.0	50.0	50.0
2011	-0.41	0.08	18.8	62.5	81.3	37.5
2012	-0.49	0.71	9.4	93.8	90.6	6.3
2013	-1.04	-1.59	6.5	6.5	93.5	93.5
2014	-0.30	-0.85	51.6	9.7	48.4	90.3
2015	-0.54	0.66	13.8	96.6	86.2	3.4

Notes: This table shows the mean changes in RPA and DRPA and the percentage of increases and decreases in RPA and DRPA for all firms in the sample by year. The variable RPA is the return-on-plan assets that is computed as the ratio between interest income and the fair value of pension plan assets at the beginning of the year. For the period from 2009 to 2012, RPA represents the expected return-on-plan assets estimated for the firm in each year. For periods beginning on or after 1 January 2013, after the revision of IAS 19, RPA is the discount rate that is estimated by the firm to compute the interest costs of the defined benefit plans. DRPA is computed as the difference between RPA and the risk-free interest rate

Table II.
Changes in RPA and DRPA by year

Table III.
Univariate results

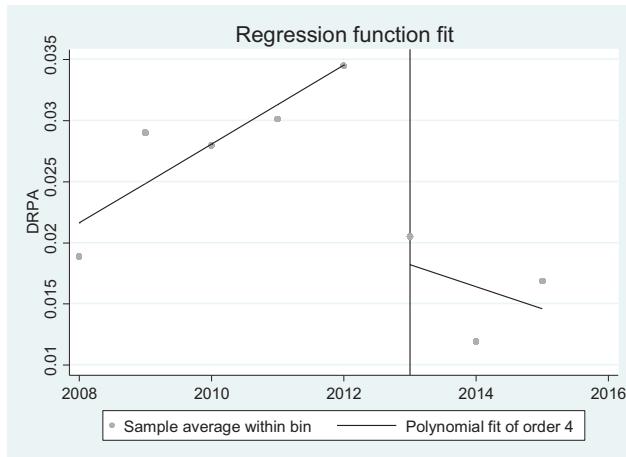
	2009/2012		2013/2015		Mean difference
	Mean	SD	Mean	SD	
RPA	0.061	0.012	0.041	0.009	0.020***
DRPA	0.029	0.012	0.016	0.009	0.013***
EPS	0.468	0.705	0.388	0.555	0.080

Notes: This table presents the univariate results regarding managerial discretion in pension assumptions. The variable RPA is the return-on-plan assets computed as the ratio between interest income and the fair value of pension plan assets at the beginning of the year. For the period from 2009 to 2012 (Pre-Rev. IAS19), RPA represents the expected return-on-plan assets that are estimated for the firm in each year. For periods beginning on or after 1 January 2013, after the revision of IAS19 (Post-Rev. IAS19), RPA is the discount rate estimated for the firm to compute interest costs of the defined benefit plans. DRPA is computed as the difference between RPA and the risk-free interest rate. EPS is the earnings per share. *p*-values for means are from *t*-tests; The *, ** and *** indicate that the mean difference is statistically significant at the 10, 5 and 1% levels, respectively

Finally, as the revised IAS 19 limits managerial discretion regarding the estimation of net interest income, we expect a decrease in the results' volatility. Therefore, we investigate the difference in the standard deviation of EPS before and after the revision. We find that there is a decrease in the standard deviation after 2013, nevertheless, the difference in the mean is not statistically significant.

5.2 Regression discontinuity design

Figure 2 shows that the DRPA drops abruptly after the adoption of the revised IAS 19, but tends to trend up before the revision.



Sources: DRPA is computed as the difference between RPA and the risk-free interest rate. The variable RPA is the return-on-plan assets that is computed as the ratio between interest income and the fair value of pension plan assets at the beginning of the year

Figure 2.
DRPA by years

Table IV shows the estimated treatment effects of the adoption of the revised IAS 19 on the DRPA that captures the managerial discretion regarding the return-on-plan assets. The results show a sharp discontinuity in 2013 that indicates a decrease in the DRPA of 0.016. This effect confirms that the changes in IAS 19 limited the use of the return-on-plan assets to manage earnings.

5.3 Multivariate tests

In this subsection, we present regression-based tests of our two hypotheses. In line with the work of Bergstresser *et al.* (2006), we regress our variable DRPA on the variable *PENSENS* that measures the pension sensitivity and the incentive to manage the estimated rate of the return-on-plan assets. The firms have higher incentives to opportunistically choose the return-on-plan assets the greater the ratio of fund assets to operating income (*PENSENS*) is (Doyle, 2017). In Table V, we confirm that after the adoption of the revised IAS 19, the effect of pension sensitivity on the choice of the return-on-plan assets decreases. The coefficient β_2 is negative (−0.003) and statistically significant at the 1 per cent level. This result provides evidence on how regulatory interventions can influence a manager’s financial reporting choices and how regulatory oversight can reduce managerial discretion (Naughton, 2015). Due to the complexity in the accounting of a defined benefits plan, our setting constitutes a

Dependent variable: DRPA	Coefficient	p-value
<i>Regression discontinuity estimates</i>		
Conventional	−0.016	0.000
Bias-corrected	−0.021	0.000
Robust	−0.021	0.000

Table IV. Regression discontinuity estimates of the effect of the IAS 19 revision on managerial discretion

Notes: The dependent variable is DPRA that is computed as the difference between RPA and the risk-free interest rate. The variable RPA is the return-on-plan assets that is computed as the ratio between interest income and the fair value of pension plan assets at the beginning of the year. The assignment variable is $POST_{REVIAS}$ that captures the change in the choice of the return-on-plan assets due to the adoption of the revised IAS 19. The cut-off year is 2013

Independent variables:	Coefficient	Predicted sign	Coefficient	p-value
<i>Intercept</i>	α_0	?	0.031	0.001
<i>PENSENS</i>	β_1	+	0.005	0.647
<i>PENSENS * POSTREVIAS</i>	β_2	−	−0.003	0.005
<i>PASSETS</i>	β_3	?	−0.001	0.843
Industry dummies			yes	
No of observations			506	
Adj- R^2			0.16	

Notes: This table presents the estimates of the coefficients from the following regression:

$$DRPA_{it} = \alpha + \beta_1 PENSENS + \beta_2 PENSENS * POST_{REVIAS} + \beta_3 PASSETS + \varepsilon$$

where DPRA is computed as the difference between RPA and the risk-free interest rate. *PENSENS* is a measure of pension sensitivity that is computed as the log ratio of plan assets to operating earnings. $POST_{REVIAS}$ is a dummy variable that equals one for the period following the implementation of the revised IAS (2013-2015) and zero for the period before the revision (2009-2012). The p-values are reported for the clustered standard error estimates on the two dimensions of firm and time (Petersen, 2009)

Table V. Impact of pension sensitivity on DRPA

useful example of the role of standard setters in the quality of financial reporting through the limitation of earnings management.

Table VI presents the results of our value relevance analysis regarding the adoption of the revised IAS 19. Both of the coefficients for *BVS* and *EPS_{REV}* are positive and statistically significant at the 5 per cent level, which indicates that accounting information did affect the market valuation of the firm before the revision of IAS 19. The findings show that there is an increase in the value relevance of the net interest income on pension plans in the period after the revision. The coefficient for β_6 is positive and statistically significant at the 10 per cent level. The high value of β_6 indicates that the regression suffers from the standard problem of omitted-correlated-variables, which is well-documented in the value relevance literature (Barth *et al.*, 2001; Aboody *et al.*, 2002). This bias may overstate the effect of *NETINTEREST* on market valuation. Further research on this limitation should be investigated.

In line with *H2*, the revision of IAS 19 limits managerial discretion by increasing the quality of reporting, and therefore, by enhancing the value relevance of earnings. Regarding the value relevance of the book value, there is no evidence of any difference between the two periods as the coefficient for β_2 is not statistically significant.

Independent variables:	Coefficient	Predicted sign	Coefficient	<i>p</i> -value
<i>Intercept</i>	α_0	?	18.800	0.002
<i>BVS</i>	β_1	+	0.509	0.037
<i>BVS</i> * <i>POST_{REVIAS}</i>	β_2	+	-0.040	0.846
<i>EPS_{REV}</i>	β_3	+	2.789	0.000
<i>EPS_{REV}</i> * <i>POST_{REVIAS}</i>	β_4	+	3.667	0.000
<i>NETINTEREST</i>	β_5	+	-25.476	0.107
<i>NETINTEREST</i> * <i>POST_{REVIAS}</i>	β_6	+	28.466	0.060
<i>DLOSS</i>	β_7		4.074	0.047
<i>ASSETS</i>	β_8		-1.459	0.000
<i>LEV</i>	β_9		10.687	0.013
<i>ROE</i>	β_{10}		0.636	0.134
Industry dummies			yes	
No of observations			495	
Adj- <i>R</i> ²			0.58	

Notes: This table presents the estimates for the coefficients from the following regression:

$$\begin{aligned}
 MVE_i = & \alpha + \beta_1 BVS + \beta_2 BVS * POST_{REVIAS} + \beta_3 EPS_{REV} + \beta_4 EPS_{REV} * POST_{REVIAS} \\
 & + \beta_5 NETINTEREST + \beta_6 NETINTEREST * POST_{REVIAS} + \beta_7 DLOSS \\
 & + \beta_8 ASSETS + \beta_9 LEV + \beta_{10} ROE + \beta_{11} IND + \varepsilon
 \end{aligned}$$

where *MVE* is the market value of equity four months after the fiscal year-end divided by the number of common shares; *BVS* is the book value of equity that is scaled by the number of common shares; *EPS_{REV}* is the EBIT plus the interest cost of pension plans minus the interest income of pension plans. *POST_{REVIAS}* is a dummy variable that equals one for the period following the implementation of the revised IAS (2013-2015) and zero for the period before the revision (2009-2012); *NETINTEREST* is interest income per share minus the interest cost per share of pension plans. *DLOSS* is a dummy variable that equals one if *EPS_{REV}* is negative and zero otherwise; *ASSETS* is the natural logarithm of total assets; *LEV* is the firm's leverage that is computed as the total liabilities divided by total assets. *ROE* is computed as EBIT divided by the book value of equity; *IND* is the industry dummies. The *p*-values are reported for the clustered standard error estimates on the two dimensions of firm and time (Petersen, 2009)

Table VI.
Value relevance
analysis after the
adoption of the
revised IAS19

6. Conclusions

This paper tests whether the revision of IAS 19 reduces the discretion that firms use in estimating the discount rate and the return rate on plan assets. The literature identifies the expected rate of the return-on-plan assets as an assumption that firms use to manage earnings (Bergstresser *et al.*, 2006; Comprix and Muller, 2006; Naughton, 2015). We advance this stream of research by examining whether the use of the discount rate to calculate the net interest cost reduces managerial discretion. To test our hypothesis, we use a sample of firms from the FTSE 100 and multivariate regression analysis to investigate whether the changes in IAS 19 regarding the measurement of the annual expense of defined benefit plans had any consequence on the value relevance of the accounting information. We also use a regression discontinuity design. This test design allows us to approach the causal effect of the revised IAS 19 by assigning a cut-off.

We predict and find that the ERR on plan assets was overvalued before 2013 due to some managerial discretion and that the revision of IAS 19 decreased managerial discretion. This result is consistent with previous papers (Bergstresser *et al.*, 2006; An *et al.*, 2014) that show that the ERR was opportunistically manipulated by managers.

On the other hand, our study also provides evidence that after the changes in the measurement of the annual expense for a defined benefits plan, a sharp increase in the value relevance of earnings occurs that indicates a decrease in managerial discretion with the consequent improvement in the quality of reporting.

This paper contributes to the literature by examining whether a change in a mandatory accounting standard influences the managers' use of discretion in pension assumptions to manage reported earnings. It is an example of how regulatory oversight can directly intervene in financial opportunism. The results of our study are also useful to analysts in understanding the behaviour of firms in the context of the selection of actuarial assumptions. The paper also contributes to the literature by providing justification for the use of the discount rate in determining the net interest on a defined benefits plan. On the other hand, our results indicate that firms use a discount rate closer to the risk-free interest rate, which is relevant for the debate about what discount rate is being determined.

Note

1. In our sample, only four firms were using the corridor approach in 2009.

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