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The predictive ability of share-based compensation expense

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This paper examines the ability of share-based compensation expense (SBCE) to predict future firm performance relative to other employee compensation expenses. It also examines whether cash settled-based compensation expense has greater predictive ability for future performance than equity settled expense. Using a sample of 443 firms listed in the UK between 2005 and 2018, we find that the predictive ability of SBCE is statistically significantly higher than that of other employee compensation expenses. Furthermore, the results show that the predictive ability of SBCE classified as cash settled is statistically significantly higher than that of equity settled SBCE. Overall, our findings suggest that recognised SBCE, particularly cash settled SBCE (i.e. fair value-adjusted expense), is useful for predicting future firm performance.

Keywords: share-based compensation; cash settled-based compensation; equity settled-based compensation; predictability; employee compensation expenses; fair value
JEL: M41; M52; J33; G32

1. Introduction

Accurate expectations of future firm performance are an essential driver of efficient price formation in capital markets (White et al. 2003, Penman 2012). The accounting literature highlights the role of current earnings in conveying information useful for predicting future firm performance (Lipe 1990, Finger 1994, Dichev and Tang 2009). It also suggests that future performance can be predicted more accurately by disaggregating total earnings into different components (Fairfield et al. 1996, Barth et al. 2001) as some components better signal future abnormal earnings, i.e. the unrecognised net assets (Barth et al. 1998).

Several studies provide empirical evidence for the relative ability of individual earnings components to predict future firm performance. This strand of literature covers income statement items such as research and development (R&D) expenditure (Lev and Sougiannis 1996), upward revaluations of fixed assets (Aboody et al. 1999), loan loss provisions (Ahmed et al. 1999), total employee expenses (Schiemann and Guenther 2013), accrual components (Barth

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et al. 2001, 2016), and fair value adjustments for financial instruments (Park et al. 1999, Dong et al. 2014, Evans et al. 2014, Bratten et al. 2016). To the best of our knowledge, our paper is the first to investigate the ability of recognised share-based compensation expense (SBCE) to predict future firm performance.[1] Specifically, our first research question examines whether the predictive ability of SBCE is higher than that of other employee compensation expenses.[2]

Employees are an important firm resource and the primary element of intellectual capital; hence, their compensation is crucial for firm performance (Lev 2001). Employee compensation costs are economically significant, representing approximately two-thirds of the cost of production (Hamermesh 1995, Bernanke 2004, Jung et al. 2014). Schiemann and Guenther (2013) report that the employee expenses of UK firms are among the largest items on the income statement. Firms typically report total employee compensation expenses disaggregated into four items: salaries and wages, social security, pension and other benefits, and SBCE.[3] These components may have differential predictive power for future firm performance. We conjecture that the predictive ability of SBCE is higher than that of other employee compensation expenses. This is because although other compensation expenses, such as salaries, could be associated with future performance (Kim and Jang 2020, Ko et al. 2022), they are largely paid to all employees as rewards for past performance. By contrast, SBCE is explicitly linked to future performance. It is incurred as a result of the share-based compensation commonly used in senior managers' contracts to incentivise retention and to improve future firm performance (Hanlon et al. 2003, Aldatmaz et al. 2018).

The link between SBCE and future firm performance is also reflected in the accounting treatment of SBCE under IFRS 2/SFAS 123R, which came as a response to the most prolonged and controversial debate in the history of accounting standard setting (Johnston 2006, Farber et al. 2007, Giner and Arce 2012).[4] IFRS 2 requires reporting entities to recognise the costs associated with share-based compensation schemes as an expense, estimated by firms using fair value at the grant date and spread over the vesting period (IASB 2004). The discretion allowed in the estimation of SBCE gives managers scope to communicate private information about their firm's financial prospects. The recognition of SBCE under the fair value approach reflects both the future targets specified in share-based contracts and managerial predictions regarding the likelihood of achieving these targets. Therefore, the recognition of SBCE in financial statements can play a key role in signalling managers' forecasts of future firm performance. However, reliability concerns linked to estimating the fair value of share-based compensation contracts could compromise the predictive capability of SBCE. This arises from the inherent uncertainty in estimation and the influence of managerial discretion and opportunistic behaviour on the inputs

[1]Hanlon et al. (2003) and Sun et al. (2009) examine the relationship between the estimated grant date fair value of executive share options and future firm performance. A few prior studies also focus on the performance consequences of different levels of share-based compensation (Mehran 1995, Ittner et al. 2003, Liu et al. 2016). However, all these studies utilise the authors' estimation of share options' values using pricing models rather than SBCE recognised in firms' income statements based on managerial projections.
[2]Throughout the paper, we use the terms 'predictive ability' and 'predictive power' interchangeably to refer to the extent to which accounting information predicts future firm performance.
[3]This disaggregation is consistent with the disclosure requirements of The UK Company Act 2006.
[4]Prior to the mandatory adoption of IFRS 2/SFAS 123R *Share-based Payments*, the cost of employee share-based compensation, was overwhelmingly disclosed in the footnotes but not recognised in the financial statements of firms. On 19 February 2004, the International Accounting Standard Board (IASB) released IFRS 2 (*Share-based Payments)*, which was first applied to accounting periods starting 1 January 2005. The US Financial Accounting Standard Board (FASB) released SFAS 123R (*Share-based Payments*) in December 2004, which was first applied to accounting periods ending in 2006.

of the valuation model (Cheng and Warfield 2005, Aboody et al. 2006, Bergstresser and Philippon 2006, Dichev and Tang 2009, Cheng et al. 2011).[5]

Our second research question investigates whether cash settled-based compensation expense (adjusted fair value) has greater predictive ability for future performance relative to equity settled (unadjusted fair value). IFRS 2 requires firms to categorise share-based compensation into equity and cash settled.[6] The general principle of the accounting treatment of SBCE is that firms should debit their income statements with the incurred expense, and credit either their equity or liability depending on whether the transaction is to be settled in equity shares or cash, respectively. Recognised SBCE is measured in a similar way using the fair value at the grant date under both classifications. However, unlike equity settled-based compensation, a firm can re-estimate the fair value of cash settled-based compensation at the end of each reporting period and at the settlement date. Consequently, a firm can revise the incurred expense, rendering the ultimate cost of cash settled rewards equal to the amount of cash paid to its employees, that is, the fair value at the settlement date. Adjusting fair value estimates of cash settled-based compensation expense gives managers greater scope to update outsiders at the end of each reporting period regarding the future prospects of a firm. However, as with the first research question, managers might opportunistically exploit the revaluation of cash settled-based compensation and the associated SBCE to maximise their own interest (Aboody 1996, Aboody et al. 2006). Prior studies such as those undertaken by Easton et al. (1993), Barth and Clinch (1998) and Aboody et al. (1999) provide evidence suggesting that managers are more likely to use fair value adjustments to present true and fair financial statements. We therefore conjecture that the predictive ability of SBCE classified as cash settled-based compensation (adjusted fair value) is greater than that of SBCE classified as equity settled (unadjusted fair value).

Following previous studies (e.g. Evans et al. 2014, Magnan et al. 2015, Ehalaiye et al. 2017), we measure future firm performance using net income and operating cash flows. Investors, analysts, institutional owners and other stakeholders rely on these two key measures for performance evaluation, equity valuation and investment decisions. The two measures are prevalent in practice and complement each other (Francis et al. 2004). Although most asset valuation models rely on predicted future cash flows, interested stakeholders may predict earnings first and derive future cash flow estimates from predicted earnings (Dechow et al. 1998, Lev et al. 2010).

Using a sample of firms listed in the Financial Times Stock Exchange (FTSE) 350 between 2005 and 2018, we find that the predictive ability of SBCE is statistically significantly higher than that of other employee compensation expenses. This aligns with the notion that SBCE, in comparison to other compensation expenses, is more closely associated with future performance, as it reflects the costs incurred by compensation packages designed to incentivise employee retention and enhance future firm performance. Furthermore, we find that the predictive ability of SBCE classified as cash settled (adjusted fair value), is statistically significantly higher than that of

[5]The fair value of share options, the most prevalent form of share-based compensation schemes, is calculated using mark to model. The IASB and the FASB do not prescribe a specific model for SBCE estimation; however, they recommend using the Black-Scholes or the Binomial model. Most companies prefer to use the Black-Scholes model as it is easier to implement, particularly when a company lacks data or resources for a more accurate valuation (Landsberg 2004). The Black-Scholes model calculates a theoretical price using five key determinants of an option's price: the current market price of the share that underlies the share option at the grant date, the exercise price of the option, the expected volatility of the share price, time to expiration, and the short-term (risk-free) interest rate.

[6]Equity settled-based compensation includes employee and executive share options, share purchase, and long-term plans among other transactions that will be settled with an entity's own instruments. By contrast, cash settled-based compensation will be settled on a cash payment that depends on the share price of the underlying instrument, as in the case of share appreciation rights.

equity settled (unadjusted fair value). In cross-sectional analyses that address the impact of managerial incentives on the predictive ability of accounting information, our main results are more pronounced among firms with incentives to report high quality financial statements and those with strong corporate governance. Because employee compensation components could have differential predictive power, we also run an additional analysis to confirm that our findings remain the same when we disaggregate other employee compensation expenses into the following components: salaries and bonuses, social securities, and pension and other benefits.

We also conduct a battery of robustness checks to validate our findings. Our results hold after using two – and three-years' ahead earnings and cash flows, adding more control variables, controlling for selection bias using the Heckman (1979) procedure, implementing GMM through the Arellano-Bond Dynamic Panel-Data estimation technique and excluding financial firms and those with restricted share plans. Overall, our robust findings indicate that recognised SBCE (cash settled SBCE) has stronger predictive power than other compensation expenses (equity settled SBCE). This suggests that recognised SBCE, particularly cash settled expense, is useful for predicting future firm performance.

This paper contributes to three streams of accounting and finance literature. Firstly, it contributes to prior literature investigating how employee share options and related expenses predict future firm performance. Existing studies focus either on voluntarily disclosed SBCE (e.g. Aboody 1996, Aboody et al. 2004, Barth et al. 2012) or the estimated value of share option grants (e.g. Hanlon et al. 2003, Sun et al. 2009). We address the predictive ability of mandatorily recognised SBCE, as managers exhibit different levels of discretion under this regime. This is because mandatorily recognised SBCE will have an impact on reported net income and render managerial compensations more transparent (Shiwakoti and Rutherford 2010, Cheng and Smith 2013). For instance, managers may choose to underestimate the recognised amount of SBCE in the income statement to minimise the political cost of the excessive remuneration they receive (Aboody et al. 2006).[7] Overall, our results suggest that the information provided by firms through recognised SBCE has predictive ability for future firm performance. Another distinctive aspect of our study is that it examines the predictive ability of SBCE from a purely accounting perspective. This complements the market-based value relevance approach in prior research, which considers market reactions (share price/returns) to SBCE (Bell et al. 2002, Aboody et al. 2004, Niu and Xu 2009, Wieland et al. 2013, Schiemann and Guenther 2013, Alhaj-Ismail et al. 2019a).[8]

Secondly, our study adds to prior research investigating the usefulness of earnings components (Lev and Sougiannis 1996, Aboody et al. 1999, Schiemann and Guenther 2013, Evans et al. 2014, Bratten et al. 2016, Ehalaiye et al. 2017). We provide evidence suggesting that recognised SBCE has more predictive power for future performance relative to other compensation expenses. This finding supports the predictive ability of earnings disaggregation, as suggested in prior research focusing on other income statement items (e.g. Fairfield et al. 1996, Barth et al. 2001). Furthermore, our paper extends prior work on the predictive ability of employee expenses (e.g. Schiemann and Guenther 2013) by showing that employee compensation components have differential predictive power for future firm performance.

Thirdly, our paper contributes to the fair value literature by examining the recognised fair value of SBCE and the usefulness of subsequent revaluations. Specifically, it adds to research on the use

[7]In addition, by examining recognised SBCE instead of relying on authors' estimations of share options (e.g. Hanlon et al. 2003, Sun et al. 2009), we can draw conclusions about firms' reporting incentives, which is central to our discussion about the predictive ability of SBCE and its components.

[8]As suggested by Bernard (1993), market-based tests offer only indirect evidence for an association between fair value estimates and future performance.

of fair value accounting for non-financial items that are not publicly traded and subject to substantial managerial discretion over valuation inputs such as non-current assets (Barth et al. 1998, Yao et al. 2018) and goodwill impairments (Jarva 2009, Bostwick et al. 2016). Managerial incentives to report the fair value of SBCE might differ from those related to other financial statement items.[9] Our paper also adds to the literature on the consequences of incorporating post-issue fair value adjustments into financial statements (see, for example, Barth and Clinch 1998, Aboody et al. 1999, Goncharov and van Triest 2011, Dong et al. 2014, Evan et al. 2014, Goncharov et al. 2014, Bratten et al. 2016, Bandyopadhyay et al. 2017, Adwan et al. 2020, Fiechter et al. 2022).[10] IFRS 2 requires fair value-based adjustments of SBCE in subsequent periods only when the associated option is classified as cash settled. Our paper is the first to study whether recognising such fair value adjustments has implications for the predictive ability of accounting information. The results suggest that the predictive ability improves when SBCE is adjusted based on the fair value of associated options. This provides vital insights to the literature calling for improvement of the accounting treatment of performance-based compensation (Core 2020, Smith 2020, Wallington et al. 2021, Zyl and Uliana 2022).

The remainder of the paper is organised as follows. In the next section, we discuss the literature review and develop our hypotheses. Section 3 presents the empirical models. Section 4 explains the sample composition, data sources, and variables used. The empirical results, additional tests and robustness checks are presented and discussed in Section 5. The final section summarises our findings and draws conclusions and inferences.

2. Literature review and hypothesis development

2.1. *The predictive ability of accounting information*

One of the key objectives of financial reporting is to assist financial statement users to efficiently allocate resources in capital markets. Rational investors, for example, make investment decisions based on a firm's projected cash flows (*IAS 7 Statement of cash flows*). Analysts are another example of users who need to predict future cash flows and net income for their valuation models. More accurate prediction and minimal revision reduce the forecast risk.

The predictive power of income components is of immense economic importance to financial statement users as it reduces forecast errors (Barth et al. 2001, 2005). Prior literature suggests that, relative to net income alone, disaggregating the income statement into different individual line items enhances the accuracy of predicting future firm performance (Fairfield et al. 1996). In this regard, different income statement components have differential information content for future firm performance, particularly those that have forward-looking properties and signal future abnormal earnings (Park et al. 1999, Barth et al. 2001, Lev et al. 2010). Indeed, a large body of research has focused on the ability of specific financial items to predict future performance. For instance, Lev and Sougiannis (1996) document a positive association between R&D expenditure and future profitability. Aboody et al. (1999) reveal a positive relationship between firms' upward revaluations of fixed assets and changes in future firm performance. Ahmed et al. (1999) report a negative relationship between discretionary loan loss provisions and future earnings before provisions. Finally, Barth et al. (2001) find that the disaggregation of accruals into components can enhance the predictive ability of earnings.

[9]For example, the fair value estimates of compensation schemes and their related recognised expenses make manager compensations more transparent (Cheng and Smith 2013).

[10]Barth (2006: 282) argues that 'there is little direct evidence demonstrating that fair values aid in predicting future cash flows'.

Several prior studies have also examined the predictive power of fair value adjustments of financial instruments. For instance, Park et al. (1999) find that the difference between the fair and book value of available for sale securities predicts future income, while this is not the case for held to maturity securities. Dong et al. (2014) document that the realised gains and losses of available for sale securities help investors to predict future bank performance. Evans et al. (2014) report a positive relationship between accumulated fair value adjustments of investment securities and future income realised from these securities. Bratten et al. (2016) provide supportive evidence suggesting that fair value adjustments included in other comprehensive income can predict future bank performance.

Related more specifically to our study, Schiemann and Guenther (2013) examine the predictive power of total employee compensation expenses for a sample of UK listed companies between 1999 and 2010. Their empirical findings suggest that total employee expenses have predictive ability with respect to future earnings. In the first research question of this paper, we examine the predictive power of employee expense components. Particularly, we compare the predictive ability of SBCE with that of other employee compensation expenses.

2.2. *The predictive ability of SBCE relative to other employee expenses*

Total employee compensation expenses in the UK typically include the following main components: salaries and bonuses, SBCE, social security, and pension and other benefits, such as restructuring and redundancy expenses. The association between these components and future firm performance might differ. We primarily differentiate between SBCE and other compensation expenses.

Other compensation expenses are largely incurred as rewards for past performance (e.g. basic salary, salary increments, and bonuses). Nevertheless, some argue that such compensation could be associated with future performance. For example, views based on 'reinforcement theory' posit that an employee's behaviour that was rewarded in the past is likely to be repeated in the future in order to maintain and improve the rewards (Thorndike 1911, Katzell and Thompson 1990, Judge and Robbins 2017). Another consistent argument is based on 'expectancy theory' which views employees' motivation as a function of the perceived linkage between their efforts and performance, as well as the rewards they are expecting to receive (Vroom 1964, Gerhart et al. 1995, Ko et al. 2022). Therefore, if employees perceive their past performance as well compensated, they will feel more motivated and increase their performance in the future, suggesting a positive link between past compensation and future firm performance (Kim and Jang 2020). However, the relationship between compensation paid to employees in the period in which the work is done and future firm performance is not clear-cut. For instance, it could be argued that such compensation may not be associated with future firm performance if they do not include (or include few) investments in intangible human capital (Regier and Rouen 2023). Moreover, a negative association could exist between other compensation expenses and future firm performance when corporate governance is weak, and managers are able to pay abnormally high wages instead of maximising shareholders' wealth (Bertrand and Mullainathan 2003).

We argue that SBCE is likely to be more associated with future firm performance than other elements of compensation expenses. This is because SBCE is explicitly linked to future firm performance. It is associated with share-based compensation that is mainly used in senior manager contracts to incentivise retention (Oyer and Schaefer 2005, Aldatmaz et al. 2018) and enhance future firm performance (Core and Guay 2001, Hanlon et al. 2003).

The link between SBCE and future firm performance is also reflected in its accounting treatment under IFRS 2. Recognised SBCE is estimated using the fair value approach which requires managers to specify both future performance targets and their estimations of the likelihood of

achieving these targets. Prior research suggests that managers often use fair value estimates as a mechanism to communicate private information (Beaver and Venkatachalam 2003). We therefore argue that recognised SBCE provides a channel through which managers communicate private information to outsiders about future performance. Cheng and Smith (2013) contend that managers are likely to use and report more accurate SBCE in order to alleviate potential additional cost penalties, which arise from future market scepticism about SBCE estimates. In general, managers are incentivised to reduce information asymmetry to reduce the cost of capital (Ball et al. 2000, Ball and Shivakumar 2005). Wang and Tan (2013) add that managers also have incentives to provide unbiased estimates so that they can establish accurate forecasting reputations.

However, some scholars have argued that the predictive ability of SBCE might be impaired due the reliability concerns associated with estimating this expense using the fair value approach. Managers might opportunistically use their discretion over the model inputs to achieve private benefits. For example, they might underestimate the recognised SBCE to mitigate the political pressure on executives' excessive remunerations or to meet earnings benchmarks (Aboody et al. 2004, 2006, Choudhary 2011). However, the empirical evidence available from scant prior studies does not support this. For instance, Barth et al. (2012) observe that excluding SBCE from pro forma earnings does not increase the ability of the latter to predict future performance. Along the same lines, Doyle et al. (2003) find that aggregate expenses typically excluded from pro forma earnings (R&D charges, SBCE and the amortisation of goodwill) significantly predict future cash flows.

There is another potential reason why SBCE is expected to be more strongly associated with future firm performance in comparison with other employee compensation expenses. SBCE arises from the share-based compensation that is typically used in executive remuneration packages, whereas other expenses relate to compensation to all company employees. More specifically, share-based compensation is frequently used in pay packages given to employees tasked with strategic decision making compared with other forms of compensation. Magnan and Martin (2018) add that the relative value of share-based compensation has increased for executives, while the opposite is true for other employees.[11] Therefore, SBCE is more likely to be linked to future firm performance.

Based on the above discussion, we expect SBCE to have a predictive ability with respect to future firm performance and that this will be higher than that of other employee compensation expenses. Accordingly, we formulate our first hypothesis as follows:

H_1: The predictive ability of recognised SBCE for future firm performance is significantly higher than that of other employee compensation expenses.

2.3. *The relative predictive ability of equity settled and cash settled SBCE*

IFRS 2 requires firms to categorise share-based compensation into equity and cash settled. Equity settled-based compensation includes, among other transactions, employee and executive share options, share purchase, and long-term plans, all of which will be settled with an entity's own instruments. By contrast, cash settled-based compensation will be settled on a cash payment that depends on the share price of the underlying instrument, as in the case of share appreciation rights or phantom shares. For both categories, firms recognise the associated expense in their

[11]For example, Chasan (2013) observes that between 2002 and 2010 in the US the number of nonexecutive employees with share options declined by a third to less than 9%.

income statements, with the credit entry recognised in equity for equity settled-based compensation, and in liability for cash settled-based compensation (IASB 2004).

Companies are required to estimate the fair value of share-based compensation for both categories at the grant date and recognise the fair value as an expense spread over the vesting period. Unlike equity settled-based compensation, firms can re-estimate the fair value of cash settled-based compensation at the end of each reporting period and at the settlement date.[12] Accordingly, companies update the recognised expense of cash settled-based compensation at each reporting date to match the amount of cash that will be paid to their employees (i.e. the fair value at the settlement date). This paper therefore compares the predictive ability of cash settled SBCE (adjusted fair value) with that of equity settled (unadjusted fair value).

The implications of incorporating post-issue fair value adjustments into financial statements have been widely debated in the accounting literature. Proponents argue that recognising fair value adjustments increases the transparency of corporate reporting and leads to investors making better informed decisions (Barth 2007, Hitz 2007, Landsman 2007). For example, Barth (2006) suggests that including more current estimates of the future through fair value accounting would enhance the ability of income to predict future cash performance. Conversely, critics such as Penman (2012) and Dichev and Tang (2009) contend that the unpredictable nature of fair value estimates can reduce the usefulness of earnings to predict future performance. Notably, numerous related studies document that different fair valued instruments have differential predictive power for future firm performance (e.g. Evan et al. 2014, Bratten et al. 2016).[13]

As explained above, IFRS 2 allows the incorporation of post-issue fair value adjustments only for SBCE classified as cash settled. This expense could therefore have more predictive power for future performance relative to equity settled SBCE. This is because the recognised expense of cash settled-based compensation reflects changes in the fair value of related compensation schemes, and hence signals managers' reassessment of the company's prospects and the likelihood of achieving future performance targets specified in share-based contracts. By contrast, not adjusting equity settled SBCE in the subsequent year after the grant date may lead to disconnection between the recognised expense and a firm's fundamentals, diminishing the predictive power of equity settled SBCE.

However, similar to our discussion regarding the first hypothesis, managers might opportunistically use the flexibility afforded under IFRS 2 to adjust the fair value of cash settled SBCE (Alhaj-Ismail et al. 2019b). Such behaviour may reduce the ability of cash settled SBCE to predict future performance. Nevertheless, the inferences that can be drawn from the scant related literature suggest that managers tend to use fair value adjustments to provide investors with useful information about a firm's financial prospects. In a survey, Easton et al. (1993) report that managers are more likely to use the revaluation allowed in accounting standards to present true and fair financial statements. Empirically, Barth and Clinch (1998) and Aboody

[12]For cash settled-based compensation, firms can re-estimate the fair value of granted instruments at the end of each reporting period and therefore adjust the recognised SBCE accordingly. By contrast, companies are not allowed to adjust the fair value of the instruments after the grant date in the case of equity settled-based compensation. They can only adjust the number of granted instruments and the subsequent SBCE in limited cases (e.g. the failure to satisfy a vesting non-market condition that was specified at the grant date).

[13]Bratten et al. (2016) find that while the net unrealised fair value adjustments included in other comprehensive income of banks can predict future earnings, the predictive ability varies between certain financial instruments. Specifically, while a bank's future performance is positively associated with fair value adjustments for available for sale securities, it is negatively associated with net unrealised gains and losses on derivative contracts classified as cash flow hedges. Evan et al. (2014) add that the fair value predictive ability varies cross-sectionally with the measurement errors associated with financial instruments.

et al. (1999) find that upward asset revaluations are associated with future cash flows and earnings. Similarly, Evans et al. (2014) document that unrealised fair value gains and losses of security investments have predictive ability for the subsequent realised income of these securities.

Based on the preceding discussion, we expect the predictive ability of cash settled SBCE to be higher than that of equity settled. Therefore, our second hypothesis is formulated as follows:

> H_2: The predictive ability of cash settled SBCE for future firm performance is significantly higher than that of equity settled.

3. Research design

We follow prior studies (e.g. Cheng and Hollie 2008, Badertscher et al. 2012, Dong et al. 2014, Bratten et al. 2016, Ehalaiye et al. 2017, Mollah et al. 2019, Fiechter et al. 2022) and measure the predictive power of SBCE and other employee compensation expenses by their ability to predict future firm performance. Future performance is measured using one-year ahead net income (Lipe 1990) and operating cash flows (Dechow et al. 1998). Specifically, we run the following regression(s):[14]

$$\begin{aligned} \boldsymbol{Adj\ NI_{it+1}\ (Adj\ OCF_{it+1})} = {} & \boldsymbol{\alpha_0 + \alpha_1\ Adj\ NI_{it} + a_2\ Other\ employee\ compensations_{it}} \\ & \boldsymbol{+ a_3\ SBCE_{it} + a_4\ Size_{it} + a_5\ MB_{it} + a_6\ Liquidity_{it} + Industry\ FE + Year\ FE + e_{it}} \end{aligned} \tag{1}$$

where subscripts *i* and *t* denote firm and year; *Adj NI (Adj OCF)* represents the net income (net cash flows arising from operating activities) plus total employee compensation expenses.[15] *SBCE* is the total recognised expense of share-based compensation. *Other employee compensations* represent total compensation expenses minus *SBCE*. All variables are measured on a per share basis.[16] We also add the following control variables: (i) *Size* denotes the natural logarithm of the total assets (ii), *MB* represents the firm's opportunity growth and is measured by market to book value of equity and (iii) *Liquidity* is a dummy variable equal to 1 if a firm pays dividends to shareholders, and 0 otherwise (Yermack 1995, Hanlon et al. 2003). The coefficients α_2 and α_3 capture the predictive ability of other employee compensation expenses and SBCE for future performance, respectively. The first hypothesis (*H1*) which states that the predictive ability of SBCE is higher than that of other employee compensation expenses is supported if the absolute value of coefficient α_3 is higher than that of α_2 and the difference is statistically significant.[17]

[14]This model allows us to directly infer from the sign and statistical significance of the item of interest whether this item has predictive ability incremental to earnings before this item (e.g. SBCE). It also allows us to further split the item of interest into different components (e.g. cash vs. equity settled SBCE) to compare their predictive ability.

[15]We adjust net income and operating cash flows as there is a potential mechanical relationship between the dependent variable (future net income and operating cash flows) and the independent variables of interest (current SBCE and other compensation expenses). This is because SBCE and other employee compensations could be sticky over time. Specifically, we add SBCE and other compensation expenses (i.e. total employee expenses) to net income and operating cash flows.

[16]We obtain virtually similar results when scaling the variables with total assets.

[17]We expect the sign of α_3 to be positive as SBCE is mainly incurred because of compensation packages designed to incentivise employee retention and enhance future performance. However, we do not predict the sign for α_2 as the direction of the association between past compensation and future firm performance is unclear (see the discussion in Section 2.2 above). We therefore test the difference in the absolute value of α_2 and α_3.

To test *H2*, we disaggregate SBCE into two main components: cash settled, and equity settled SBCE. Specifically, we run the following regression(s):

$$\begin{aligned} \textit{Adj NI}_{it+1}\ (\textit{Adj OCF}_{it+1}) = {} & \beta_0 + \beta_1\ \textit{Adj NI}_{it} + \beta_2\ \textit{other employee compensations}_{it} \\ & + \beta_3\ \textit{Equity settled}_{it} + \beta_4\ \textit{Cash settled}_{it} \\ & + \beta_5\ \textit{Size}_{it} + \beta_6\ \textit{MB}_{it} + \beta_7\ \textit{Liquidity}_{it} + \textit{Industry FE} + \textit{Year FE} + e_{it} \end{aligned} \quad (2)$$

where *Equity settled* is the recognised equity settled SBCE and *Cash settled* is the recognised cash settled SBCE. The remaining variables are as defined in model (1). The coefficients β_3 and β_4 represent the ability of equity settled and cash settled SBCE to predict future performance, respectively. The second hypothesis (*H2*) which states that the predictive power of cash settled SBCE is higher than that of equity settled is supported if the absolute value of coefficient β_4 is higher than that of β_3 and the difference is statistically significant. In both regressions, we include industry and year fixed effect and cluster standard errors by firms. We test for the difference between the coefficients of the variables of interest in each model using the Wald test.

4. Sample, data, and descriptive statistics

We start our sample with all firms included in the FTSE 350 in any year between 2005, the first year of the mandatory adoption of IFRS 2, and 2018. We manually collect data on SBCE and its two components of equity settled and cash settled expenses from firms' annual reports. We require firms to use share-based compensation for at least one year over the study period. Our initial sample comprises 484 listed firms. All other variables are obtained from Refinitiv Datastream. We exclude 41 firms where the data needed to estimate our main models is missing. The final sample used to test *H1* and *H2* consists of 3,819 firm-year observations relating to 443 firms.

Table 1 provides an overview of observations and firms per industry based on the Industrial Classification Benchmark (ICB) for our sample. Consumer cyclical, financial and industrial are the most representative sectors, which together account for more than 60% of our sample firms. By contrast, utility, healthcare and telecommunications sectors have the smallest numbers of firms.

Table 2 reports the summary statistics for the main variables used in the study. It shows that the mean (median) of other employee compensation expenses of our sample firms is 1.136 (0.643). This is consistent with the descriptive statistics of employee compensation expenses reported by Schiemann and Guenther (2013) for their UK sample over the period from 1999

Table 1. Sample distribution by sector.

Sector	Firms	Percent	Observations	Percent
Basic Materials	38	8.58%	328	8.59%
Consumer Cyclicals	99	22.35%	843	22.07%
Consumer Non-Cyclicals	29	6.55%	281	7.36%
Energy	31	7.00%	202	5.29%
Financial	94	21.22%	820	21.47%
Healthcare	18	4.06%	145	3.80%
Industrials	80	18.06%	780	20.42%
Technology	26	5.87%	210	5.50%
Telecommunications	15	3.39%	92	2.41%
Utilities	13	2.93%	118	3.09%
Total	443	100.00%	3,819	100.00%

Table 2: Descriptive statistics.

	Mean	SD	P5	P50	P95
Dependent variables					
Adj. NI_{it+1}	1.699	2.028	0.006	1.054	5.675
Adj. CFO_{it+1}	1.914	2.007	0.089	1.232	6.502
Independent variables					
Adj. NI_{it}	1.680	2.013	0.056	1.045	5.691
Other employee Compensations$_{it}$	1.136	1.367	0.048	0.643	4.118
$SBCE_{it}$	0.027	0.040	0.001	0.013	0.106
Equity settled $SBCE_{it}$	0.025	0.037	0.001	0.012	0.097
Cash settled $SBCE_{it}$	0.002	0.006	0.000	0.000	0.007
$Size_{it}$	7.890	1.724	5.615	7.601	11.513
MB_{it}	3.228	4.509	0.550	2.280	10.210
$Liquidity_{it}$	0.895	0.306	0.000	1.000	1.000

Notes: All variables are defined in Appendix A. This table reports the descriptive statistics for the variables employed in equations (1) and (2) for 3,819 observations pertaining to 443 firms over the period 2005-2018.

to 2010. Table 2 also reveals that the mean (median) of SBCE over the sample period is 0.027 (0.013). The means of the recognised equity and cash settled-based compensation expense are 0.025 and 0.002, respectively.

5. Empirical results

5.1. *The predictive ability of SBCE and other employee compensation expenses*

Table 3 (Panel A) presents the results of testing *H1* concerning the predictive ability of SBCE for future firm performance relative to that of other employee compensation expenses. In Column 3, we report the results of running equation (1). This shows that the coefficient on *Adj. NI* is positive and statistically significant. This implies that current earnings before total employee compensation expenses predict future firm performance. Column 3 also reveals that the coefficient on other employee compensation expenses is positive and statistically significant ($a_2 = 0.392$, t-statistic = 5.61 in the net income model; $a_2 = 0.892$, t-statistic = 9.86 in the cash flows model). The significant positive sign suggests that other compensation expenses have predictive ability for future performance. It also indicates that past employee compensation is positively associated with future firm performance. This is consistent with the arguments based on 'reinforcement theory' and 'expectancy theory' suggesting that effective past rewards could motivate employees to improve future firm performance (Gerhart et al. 1995, Katzell and Thompson 1990). In terms of economic significance, the reported results indicate that for the average firm, a one-standard-deviation increase in other employee compensation is associated with an increase of 26.42% (0.392 × 1.367/2.028) of a standard deviation in future net income before compensation, while future cash flows before compensation increase by 60.76% (0.892 × 1.367/2.007), ceteris paribus.

The coefficient on SBCE is positive and statistically significant at the 1% level ($a_3 = 4.608$, t-statistic = 4.42 in the net income model; $a_3 = 5.361$, t-statistic = 2.66 in the cash flows model). The statistically significant association with future performance suggests that SBCE has predictive power for future performance. With regard to economic significance, the results indicate that, for the average firm, a one-standard-deviation increase in SBCE is associated with an increase of 9.01% (4.608 × 0.040/2.028) of a standard deviation in net income before compensation, ceteris paribus, while future cash flows before compensation increase by 10.68% (5.361 × 0.040/2.007).

Table 3. The main results (H1).

Panel A: variables:	*Adj. NI_{it+1}*			*Adj. CFO_{it+1}*		
	1	2	3	1	2	3
Adj. NI_{it}	0.892***	0.685***	0.606***	0.712***	0.214**	0.122
	(48.68)	(12.39)	(9.35)	(12.31)	(2.45)	(1.53)
Other employee compensations$_{it}$ (a_2)		0.351***	0.392***		0.844***	0.892***
		(5.13)	(5.61)		(8.97)	(9.86)
$SBCE_{it}$ (a_3)			4.608***			5.361***
			(4.42)			(2.66)
$Size_{it}$	0.011	0.015	0.007	0.099***	0.109***	0.100***
	(1.12)	(1.51)	(0.81)	(2.85)	(3.44)	(3.17)
MB_{it}	0.011***	0.016***	0.014***	0.006	0.018**	0.015*
	(2.92)	(3.80)	(3.63)	(0.76)	(2.24)	(1.94)
$Liquidity_{it}$	0.079**	0.084***	0.088***	0.018	0.029	0.035
	(2.49)	(2.61)	(2.74)	(0.10)	(0.16)	(0.20)
Constant	0.115	0.093	0.099	0.370	0.318	0.325
	(1.16)	(0.89)	(1.04)	(0.87)	(0.79)	(0.82)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.807	0.816	0.821	0.582	0.633	0.640
Observations	3,819	3,819	3,819	3,819	3,819	3,819
$\|a_3\| - \|a_2\| > 0$ (Two-tailed F test)			**21.25*** **			**9.74*** **

Panel B: Comparison of goodness of fit using Clarke (2003, 2007) test	Clarke test Z-statistic	Clarke test Z-statistic
Goodness of fit (2) – Goodness of fit (1) > 0	2.102**	1.250
Goodness of fit (3) – Goodness of fit (1) > 0	3.083***	2.034**
Goodness of fit (3) – Goodness of fit (2) > 0	12.685***	14.317***

Notes: All variables are defined in Appendix A. This table reports the results of testing the first hypothesis which states the predictive ability of recognised SBCE for future firm performance is statistically significantly higher than that of other employee compensation expenses. Panel A, Column 3 reports the main results by running equation (1) for a sample of firms listed in the UK between 2005 and 2018. Panel B reports the results of comparing adjusted. R^2 using the Clarke (2003, 2007) test to measure the incremental predictive ability of SBCE and other compensation expenses. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

Table 3 (Panel A) also presents the results of testing the difference in the magnitude (the absolute value) of a_2 and a_3. The coefficient on SBCE is statistically significantly higher than that for other employee compensation expenses ($|a_3| - |a_2| > 0$, F test = 21.25 in the net income model, F test = 9.74 in the cash flows model). This result is consistent with *H1* in that the predictive ability of recognised SBCE for future performance is higher than that of other employee compensation expenses. Table 3 demonstrates that this finding holds when running the analysis using both measures of future firm performance, net income and operating cash flows.

While the results presented use the coefficients estimates on income components to test their predictive ability for future performance, some related literature also uses the change in the goodness of fit (adjusted R^2) to examine the predictive ability of accounting information (e.g. Barth et al. 2012). To facilitate comparison with this literature, Panel B in Table 3 reports the results of testing the incremental goodness of fit, adjusted R^2, for the main variables of interest in equation (1) (other employee compensation expenses and SBCE). Specifically, we use the test developed

by Clarke (2003, 2007) to examine the increase in the predictive ability of current earnings when first adding employee compensation expenses and then SBCE. The reported results indicate that including other employee compensation expenses to the base current earning model increases ability of the latter to predict future performance (Goodness of fit (Column 2) – Goodness of fit (Column 1) > 0, Z-statistic = 2.102 in the net income model, Z-statistic = 1.25 in the cash flows' model). Importantly, adding SBCE to the model that includes current earnings and other employee compensation expenses increases the predictive ability of current earnings for future performance (Goodness of fit (Column 3) – Goodness of fit (Column 2) > 0, Z-statistic = 12.685 in the net income model, Z-statistic = 14.317 in the cash flows' model). This suggests that SBCE contributes incremental information content for future performance over and above current earnings and other compensation expenses. Thus, our results continue to hold when using goodness of fit to test predictive ability.

Our findings reveal that SBCE has a stronger association with future firm performance than other compensation expenses. This is in line with the notion that SBCE is used in senior management contracts and is explicitly linked to future performance. By contrast, other compensation expenses are incurred mainly as rewards for past performance. That is, employee expense components have different implications for predicting future firm performance, which adds existing literature on the predictive ability of earnings components (Lev and Sougiannis 1996, Aboody et al. 1999, Schiemann and Guenther 2013, Evans et al. 2014, Bratten et al. 2016, Ehalaiye et al. 2017). Furthermore, the higher predictive ability of SBCE suggests that managers use the discretion allowed in reporting this fair value-based expense to communicate private information about a firm's financial prospects (Doyle et al. 2003, Barth et al. 2012).

5.2. *The predictive ability of equity settled and cash settled SBCE*

Table 4 (Panel A) presents the results for testing *H2,* which examines the predictive ability of cash settled SBCE relative to that of equity settled. Column 3 shows that the estimated coefficient on equity settled SBCE is positive and statistically significant ($\beta_3 = 3.395$, t-statistic = 3.22 in the net income model; $\beta_3 = 3.713$, t-statistic = 1.67 in the cash flows' model). Similarly, the coefficient on cash settled SBCE is positive and statistically significant ($\beta_4 = 19.26$, t-statistic = 4.13 in the net income model; $\beta_4 = 23.99$, t-statistic = 2.72 in the cash flows model). That is, both classifications of SBCE have predictive ability with respect to future firm performance. In terms of economic significance, for the average firm, a one-standard-deviation increase in equity settled SBCE is associated with an increase of 6.19% (3.395 × 0.037/2.028) of a standard deviation in net income before compensation, ceteris paribus, while future cash flows before compensation increase by 6.85% (3.713 × 0.037/2.007). A one-standard-deviation increase in cash settled SBCE is associated with an increase of 5.70% (19.260 × 0.006 /2.028) of a standard deviation in net income before compensation, ceteris paribus, while future cash flows before compensation increase by 7.17% (23.99 × 0.006 /2.007).

The results of testing *H2* are reported in Table 4 (Panel A). The coefficient on cash settled-based compensation is statistically significantly greater in magnitude than that of equity settled-based compensation expense ($|\beta_4| - |\beta_3| > 0$, F test = 11.44 in the net income model, F test = 4.81 in the cash flows' model). This result is consistent with *H2* in that the predictive ability of cash settled SBCE (adjusted fair value) is statistically significantly higher than that of equity settled (unadjusted fair value). IFRS 2 requires firms to re-estimate the fair value of cash settled-based compensation and the associated expense at the end of each reporting period until the settlement date. The recognised cash settled-based compensation expense reflects changes in the fair value of related compensation schemes and the likelihood of achieving prespecified performance

Table 4. The main results (H2).

Panel A: variables:	*Adj. NI*$_{it+1}$			*Adj. CFO*$_{it+1}$		
	1	2	3	1	2	3
Adj. NI$_{it}$	0.685***	0.627***	0.607***	0.214**	0.150*	0.125
	(12.39)	(10.05)	(9.20)	(2.45)	(1.90)	(1.60)
Other employee compensations$_{it}$	0.351***	0.378***	0.400***	0.844***	0.875***	0.901***
	(5.13)	(5.47)	(5.63)	(8.97)	(9.63)	(10.06)
Equity Settled$_{it}$ ($\boldsymbol{\beta}_3$)		3.781***	3.395***		4.191*	3.713*
		(3.59)	(3.22)		(1.90)	(1.67)
Cash Settled$_{it}$ ($\boldsymbol{\beta}_4$)			19.260***			23.990***
			(4.13)			(2.72)
Size$_{it}$	0.015	0.009	0.006	0.109***	0.102***	0.0989***
	(1.51)	(1.00)	(0.75)	(3.44)	(3.24)	(3.15)
MB$_{it}$	0.016***	0.015***	0.013***	0.018**	0.016**	0.014**
	(3.80)	(3.59)	(3.81)	(2.24)	(2.02)	(2.03)
Liquidity$_{it}$	0.084***	0.091***	0.076**	0.029	0.037	0.019
	(2.61)	(2.84)	(2.37)	(0.16)	(0.21)	(0.11)
Constant	0.093	0.096	0.100	0.318	0.321	0.326
	(0.89)	(0.97)	(1.07)	(0.79)	(0.81)	(0.83)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.816	0.819	0.822	0.633	0.637	0.641
Observations	3,819	3,819	3,819	3,819	3,819	3,819
$\boldsymbol{\lvert\beta_4\rvert - \lvert\beta_3\rvert > 0}$ ***(Two-tailed F test)***			**11.44*** **			**4.81** **

Panel B: Comparison of goodness of fit using Clarke (2003, 2007) test

	Clarke test Z-statistic	Clarke test Z-statistic
Goodness of fit (2) – Goodness of fit (1) > 0	12.769***	14.382***
Goodness of fit (3) – Goodness of fit (1) > 0	16.491***	18.361***
Goodness of fit (3) – Goodness of fit (2) > 0	28.197***	27.442***

Notes: All variables are defined in Appendix A. This table reports the results of testing the second hypothesis which states the predictive ability of cash settled SBCE for future firm performance is higher than that of equity settled. Panel A, Column 3 reports the main results by running equation (2) for a sample of firms listed in the UK between 2005 and 2018. Panel B reports the results of comparing adjusted. R^2 using the Clarke (2003, 2007) test to measure the incremental predictive ability of equity settled SBCE and equity settled SBCE. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

targets. This can explain the higher predictive ability of cash settled-based compensation expense relative to that classified as equity settled.

The results of testing the incremental goodness of fit, adjusted R^2, for the variables of interest in equation 2 (*Equity settled* and *Cash settled*) are presented in Table 4 (Panel B). These indicate that both equity and cash settled SBCE have predictive power for future performance. Furthermore, cash settled SBCE contributes incremental information content for future performance over and above current earnings, other compensation expenses, and equity settled SBCE. That is, our results hold using both coefficient estimates and incremental goodness of fit as measures for predictive ability.

Our findings support the claim that managers use fair value adjustments to provide information about firms' financial prospects (Easton et al. 1993, Barth and Clinch 1998, Aboody et al. 1999, Evans et al. 2014, Bratten et al. 2016).

Overall, our results for *H1* and *H2* suggest that SBCE, particularly cash settled component, is useful for predicting future firm performance.

5.3. *Additional analyses and robustness checks*

We conduct a series of additional analyses to further investigate our findings. We also run several checks to ensure our results are robust.

5.3.1. *Additional analyses*

As discussed with respect to hypothesis development, the predictive ability of SBCE and its components could be influenced by managerial incentives due to the substantial discretion allowed in the related accounting treatment. We therefore run a cross-sectional analysis to investigate whether our results vary with firm-level reporting incentives. Specifically, our sample is partitioned based on the median of a constructed proxy that captures firms' incentives to report quality financial statements. Following Daske et al. (2013), we measure reporting incentives by the first and primary factor (out of three that are retained) when applying factor analysis to the following five firm attributes: firm size (natural log of market capitalisation), financial leverage (total liabilities over total assets), profitability (return on assets), growth opportunities (book-to-market ratio), and ownership concentration (percentage of closely held shares). This measure captures firm's incentives to report quality financial statements, as managers in firms that are larger, more profitable, and have more substantial financing needs, greater growth opportunities, and more dispersed ownership structures are likely to have stronger incentives for transparent financial reporting. We divide the sample based on the median of this measure into high quality versus low quality. Our expectation is that firms with stronger incentives to provide high-quality financial statements are likely to report more reliable fair value estimates (e.g. SBCE) that better predict future performance (Aboody et al. 2004, Bratten et al. 2016).

The results presented in Table 5 confirm the above expectation. Specifically, our first finding that the predictive ability of recognised SBCE for future firm performance is statistically significantly higher than that of other employee compensation expenses seems to be more pronounced in firms with stronger incentives to provide high-quality financial reporting. This is also confirmed by the statistically significant difference in the magnitude of coefficients on SBCE across the two subsamples when we employ the chi-square test ($| a_3 \text{ HQ} | - | a_3 \text{ LQ} | > 0$, x^2 test = 2.86 in the net income model, $| a_3 \text{ HQ} | - | a_3 \text{ LQ} | > 0$, x^2 test = 8.76 in the cash flows model). Similarly, our finding that the predictive ability of SBCE classified as cash settled is higher than that classified as equity settled is more pronounced for the subsample of firms with high-quality reporting. The comparison across subsamples reveals larger coefficients on SBCE and its components for high quality reporting firms, although the difference between them is not always statistically significant. Overall, Table 5 suggests that our main findings are more salient for firms with stronger incentives to provide high-quality financial reporting.

Corporate governance can play a significant role in determining managerial discretion over accounting information. We therefore run another cross-sectional analysis in which we partition our sample into strong and weak corporate governance firms using the median value of governance score over the study period. We extract the score of governance quality from Refinitiv Datastream following previous research such as Hayat and Hassan (2017) and Charitou et al. (2018).[18]

[18]The corporate governance score is Refinitiv Datastream's measure of corporate governance. It accounts for board structure, compensation policy, board functions, shareholder rights, and vision and strategy. Its value ranges from 0 to 1, with higher values reflecting better corporate governance quality.

Table 5. Results (high vs. low financial reporting quality).

	Dependent variable: $Adj.NI_{it+1}$				Dependent variable: $Adj.CFO_{it+1}$			
	High quality (HQ)		Low quality (LQ)		High quality (HQ)		Low quality (LQ)	
	H1	H2	H1	H2	H1	H2	H1	H2
$Adj.\ NI_{it}$	0.599***	0.602***	0.676***	0.681***	0.189*	0.189*	0.067	0.068
	(20.19)	(20.51)	(22.92)	(22.49)	(1.79)	(1.81)	(0.52)	(0.52)
Other employee compensations$_{it}$ (a_2)	0.406***	0.414***	0.322***	0.321***	0.787***	0.794***	0.967***	0.967***
	(8.94)	(9.23)	(8.64)	(8.46)	(7.24)	(7.29)	(6.40)	(6.41)
$SBCE_{it}$ (a_3)	5.722***		2.282***		10.24***		2.820	
	(6.16)		(2.97)		(3.04)		(0.93)	
Equity Settled$_{it}$ (β_3)		4.092***		1.604**		9.408**		2.721
		(4.18)		(2.33)		(2.45)		(0.84)
Cash Settled$_{it}$ (β_4)		15.344***		5.122		14.87***		11.58
		(7.34)		(1.39)		(4.46)		(1.06)
$Size_{it}$	0.012	0.012	−0.006	−0.013	0.071*	0.073*	0.136**	0.136**
	(0.73)	(0.76)	(−0.32)	(−0.65)	(1.73)	(1.76)	(1.99)	(1.99)
MB_{it}	0.007	0.001	0.014**	0.001	0.002	0.002	0.008	0.007
	(1.46)	(0.67)	(2.05)	(0.68)	(0.28)	(0.27)	(0.89)	(0.84)
$Liquidity_{it}$	0.096	0.091	0.051	0.045	−0.386	−0.392	0.051	0.043
	(0.95)	(0.89)	(0.80)	(0.71)	(−0.55)	(−0.56)	(0.44)	(0.38)
Constant	0.147	0.141	0.263	0.373*	0.341	0.340	−0.597	−0.598
	(0.75)	(0.73)	(1.33)	(1.94)	(0.47)	(0.46)	(−1.20)	(−1.20)
$\mid a_3 \mid - \mid a_2 \mid > 0$ ***(Two-tailed F test)***	**43.31*** **		**11.20*** **		**10.70*** **		**1.61**	
$\mid \beta_4 \mid - \mid \beta_3 \mid > 0$ ***(Two-tailed F test)***		**25.74*** **		**0.88**		**1.24**		**1.57**
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.821	0.824	0.839	0.838	0.720	0.721	0.692	0.693
Observations	1,459	1,459	1,458	1,458	1,459	1,459	1,458	1,458
$SBCE_{it}$ (a_3) HQ > $SBCE_{it}$ (a_3) LQ			2.86*				8.76***	

Equity Settled$_{it}$ (β_3)	1.41	7.14**
HQ > *Equity Settled*$_{it}$ (β_3) LQ		
Cash Settled$_{it}$ (β_4)	3.08*	0.11
HQ > *Cash Settled*$_{it}$ (β_4) LQ		

Notes: All variables are defined in Appendix A.This table reports the results from running equations (1) and (2) after dividing the sample into high and low financial reporting quality. Firms are classified as low financial reporting quality based on the median value of the score obtained from our constructed proxy of reporting incentives. We measure the reporting incentives variable as the first and primary factor (out of three that are retained) when applying factor analysis to the following six firm attributes: firm size (natural log of market value), financial leverage (total liabilities over total assets), profitability (return on assets), growth opportunities (book-to-market ratio), and ownership concentration (percentage of closely held shares). *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

Table 6. Results (high vs. low corporate governance quality).

	Dependent variable: *Adj.NI*$_{it+1}$				Dependent variable: *Adj.CFO*$_{it+1}$			
	High governance score (HGS)		Low quality (LQ)		High governance score (HGS)		Low governance score (LGS)	
	H1	H2	H1	H2	H1	H2	H1	H2
Adj. NI$_{it}$	0.608***	0.614***	0.595***	0.591***	0.0213	0.0288	0.187***	0.191***
	(7.38)	(7.22)	(6.01)	(5.91)	(0.17)	(0.24)	(2.69)	(2.84)
Other employee compensations$_{it}$ (a_2)	0.368***	0.366***	0.430***	0.445***	0.997***	0.995***	0.854***	0.861***
	(3.80)	(3.65)	(4.25)	(4.39)	(6.94)	(7.29)	(8.47)	(8.55)
SBCE$_{it}$ (a_3)	4.781***		4.276**		7.780***		3.018	
	(4.18)		(2.48)		(3.21)		(0.98)	
Equity Settled$_{it}$ (β_3)		3.623***		2.875*		5.932**		1.746
		(3.04)		(1.71)		(2.22)		(0.54)
Cash Settled$_{it}$ (β_4)		24.00***		15.16**		41.16***		8.103
		(3.40)		(2.30)		(3.31)		(1.02)
Size$_{it}$	0.005	0.004	−0.001	−0.001	0.063	0.061	0.170***	0.171***
	(0.46)	(0.40)	(−0.01)	(−0.02)	(1.38)	(1.40)	(3.74)	(3.73)

(*Continued*)

Table 6. Continued.

	Dependent variable: $Adj.NI_{it+1}$				Dependent variable: $Adj.CFO_{it+1}$			
	High governance score (HGS)		Low quality (LQ)		High governance score (HGS)		Low governance score (LGS)	
	H1	H2	H1	H2	H1	H2	H1	H2
MB_{it}	0.018**	0.0154**	0.009***	0.00901***	0.025	0.021*	0.009*	0.009*
	(2.28)	(2.24)	(3.01)	(3.07)	(1.65)	(1.68)	(1.82)	(1.89)
$Liquidity_{it}$	0.100**	0.085*	0.076*	0.065	0.306*	0.280*	−0.241	−0.248
	(2.15)	(1.93)	(1.71)	(1.42)	(1.81)	(1.69)	(−0.84)	(−0.86)
Constant	−0.042	−0.016	−0.008	0.009	−0.312	−0.266	−0.557	−0.549
	(−0.42)	(−0.18)	(−0.06)	(0.07)	(−0.84)	(−0.73)	(−1.37)	(−1.34)
$\mid a_3 \mid - \mid a_2 \mid > 0$ ***(Two-tailed F test)***	**18.27*****		**7.04*****		**13.19*****		**1.61**	
$\mid \beta_4 \mid - \mid \beta_3 \mid > 0$ ***(Two-tailed F test)***		**8.18*****		**3.72***		**7.31*****		**0.73**
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.822	0.816	0.824	0.816	0.650	0.656	0.647	0.646
Observations	1,905	1,905	1,902	1,902	1,905	1,905	1,902	1,902
$SBCE_{it}$ (a_3) HGS > $SBCE_{it}$ (a_3) LGS	0.13				3.89**			
Equity Settled$_{it}$(β_3) HGS > *Equity Settled*$_{it}$ (β_3) LGS	0.27				2.80*			
Cash Settled$_{it}$ (β_4) HGS > *Cash Settled*$_{it}$ (β_4) LGS	3.83**				8.92***			

Notes: All variables are defined in Appendix A.This table reports the results from running equations (1) and (2) after dividing the sample into strong and weak corporate governance. Firms are classified based on the median value of the average corporate governance score over the study period 2005-2018. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

The rationale for this is that firms with strong corporate governance are likely to provide better quality accounting estimates with more predictive power for future performance (Mollah et al. 2019). For example, Aboody et al. (2006) and Bartov et al. (2007) find that firms with weak corporate governance are more likely to underestimate the disclosed SBCE. Consistent with this, Table 6 reports that the results of testing the two main hypotheses are more salient for firms that have strong corporate governance.[19] Moreover, the table reveals larger coefficients on SBCE and its components for the subsample of firms with high governance score, although the difference between the two-sample is not always statistically significant.

In our main analysis above, we aggregate the other compensation expenses as a whole, facilitating a comparison of the predictive ability of SBCE with the average predictive ability of these expenses. However, it is essential to note that the components of compensation expenses may exhibit different predictive abilities and carry different weights relative to total compensation expenses. For example, salaries constitute the biggest component of employee compensation structure (Conyon and Sadler 2010, Ferri and Maber 2013, Ehrlich and Radulescu 2017). To address this point, we rerun equations (1) and (2) after disaggregating other compensation expenses into the following components: salaries and bonuses, social securities, and pension and other benefits. This enables us to draw inferences about the predictive ability of each individual component of compensation expenses and assess the predictive ability of SBCE in relation to each component in turn. The results reported in Table 7 reveal that coefficients on the components of other employee compensations are all positive and mostly statistically significant, suggesting that they have predictive ability with respect to future firm performance. Importantly, the coefficient on SBCE is statistically significantly greater in magnitude than the coefficients on the components of other employee compensation expenses. This confirms our finding that SBCE has greater predictive power than other forms of compensation expenses. In addition, the results presented in Table 7 confirm that after controlling for the components of other employee compensation expenses, the predictive ability of SBCE classified as cash settled is higher than that of equity settled ($|\beta_3| - |\beta_2| > 0$, F test = 10.77 in the net income model, F test = 4.43 in the cash flows' model).

The types of vesting conditions embedded in share-based contracts might influence the predictive ability of SBCE. For instance, share-based compensation schemes tied to performance-based vesting conditions are likely to have greater predictive ability than those tied to time (service) vesting conditions. However, in the UK, the use of share-based contracts that are subject only to time vesting is extremely rare (Barty and Jones 2012). By contrast, compensation schemes tied to performance vesting conditions are commonplace among UK firms (Carter et al. 2009). For example, the percentage of large UK firms that use share-based compensation linked to performance vesting conditions grew rapidly from 60% in 1997 to 90% in 2003 (Conyon et al. 2000, Kuang and Suijs, 2006). The recommendations of the Greenbury Report (1995)[20] and further pressure from influential shareholder groups are considered the main drivers of the

[19]As an alternative measure of corporate governance, we follow the approach by Huang et al. (2018) and construct a governance index using the natural logarithm of one plus the value of the following zero/one variables: presence/absence of remuneration committee, presence/absence of audit committee, presence/absence of corporate governance committee, presence/absence of nomination committee, presence/absence of corporate social responsibility committee, CEO-chair separation, and whether shareholders have the right to vote on executive remuneration. Again, our untabulated results are more pronounced for firms with higher governance index values.

[20]Firms are strongly recommended by the Greenbury Report to tie managerial share option schemes to challenging performance criteria.

Table 7. Results after disaggregating other employee compensations into components.

	Adj. NI_{it+1}		*Adj. CFO_{it+1}*	
	H1	*H2*	*H1*	*H2*
Adj. NI_{it}	0.557***	0.558***	0.109	0.113*
	(9.73)	(9.60)	(1.59)	(1.70)
$SBCE_{it}$ (a_2)	4.749***		5.437***	
	(4.48)		(2.71)	
Equity Settled$_{it}$ (β_2)		3.494***		3.817*
		(3.24)		(1.73)
Cash Settled$_{it}$ (β_3)		19.07***		22.17**
		(4.08)		(2.57)
Salaries & bonuses$_{it}$ (a_3)	0.385***	0.398***	0.727***	0.741***
	(5.03)	(5.24)	(5.58)	(5.75)
Social securities$_{it}$ (a_4)	1.131*	1.030	2.585*	2.459*
	(1.79)	(1.48)	(1.90)	(1.92)
Post Employment Benefits $_{it}$ (a_5)	1.346**	1.440***	2.208*	2.332**
	(2.50)	(2.73)	(1.91)	(2.02)
Size$_{it}$	0.001	0.001	0.090***	0.089***
	(0.16)	(0.03)	(2.87)	(2.85)
MB_{it}	0.014***	0.013***	0.013*	0.013*
	(3.60)	(3.82)	(1.79)	(1.86)
Liquidity$_{it}$	0.087***	0.076**	0.024	0.011
	(2.69)	(2.36)	(0.14)	(0.06)
Constant	−0.061	−0.037	−0.286	−0.259
	(−0.79)	(−0.51)	(−1.02)	(−0.93)
$\lvert a_2 \rvert - \lvert a_3 \rvert > 0$ *(Two-tailed F test)*	**21.85*** **		**9.46*** **	
$\lvert a_2 \rvert - \lvert a_4 \rvert > 0$ *(Two-tailed F test)*	**21.09*** **		**9.92*** **	
$\lvert a_2 \rvert - \lvert a_5 \rvert > 0$ *(Two-tailed F test)*	**37.71*** **		**13.48*** **	
$\lvert \beta_3 \rvert - \lvert \beta_2 \rvert > 0$ *(Two-tailed F test)*		**10.77*** **		**4.43** **
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
adj. R^2	0.826	0.827	0.645	0.645
Observations	3,819	3,819	3,819	3,819

Notes: All variables are defined in Appendix A. This table reports the results from running equations (1) and (2) over the period 2005–2018 after disaggregating other employee compensations into three different components: salaries and bonuses, social securities and postemployment benefits. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

prevalence of share-based compensation contracts with performance vesting conditions in the UK (Young and Yang 2011). Consistent with this, our sample includes only 64 firms that report the use of time vesting share-based contracts in their annual reports. Therefore, to filter out the effect of contracts with time vesting conditions on our main findings, we re-estimate our regressions after excluding these firms.[21] Table 8 shows that our results remain unchanged following this exclusion.

[21]Alternatively, we re-estimate our main models after omitting 127 observations in which firms report the use of contract with time vesting conditions. Our results do not alter following this alternative exclusion.

Table 8. Results after excluding firms that use time vesting share-based contracts.

	Adj. NI_{it+1}		*Adj. CFO_{it+1}*	
	H1	*H2*	*H1*	*H2*
Adj. NI_{it}	0.640***	0.632***	0.112	0.180**
	(9.14)	(8.68)	(1.27)	(2.12)
Other employee compensations$_{it}$ (a_2)	0.366***	0.377***	0.921***	0.901***
	(4.50)	(4.60)	(9.21)	(9.11)
$SBCE_{it}$ (a_3)	3.918***		5.510**	
	(3.80)		(2.44)	
Equity Settled$_{it}$ (β_3)		2.697***		−0.535
		(3.71)		(−0.17)
Cash Settled$_{it}$ (β_4)		15.17***		25.24**
		(3.59)		(2.34)
$Size_{it}$	−0.001	−0.001	0.084**	0.092***
	(−0.21)	(−0.08)	(2.54)	(2.75)
MB_{it}	0.011***	0.011***	0.014*	0.014*
	(2.89)	(3.02)	(1.71)	(1.93)
$Liquidity_{it}$	0.057*	0.057*	−0.007	−0.024
	(1.72)	(1.67)	(−0.04)	(−0.12)
Constant	0.021	0.026	−0.146	−0.158
	(0.26)	(0.33)	(−0.47)	(−0.52)
$\lvert a_3 \rvert - \lvert a_2 \rvert > 0$ *(Two-tailed F test)*	**15.76*** **		**8.17*** **	
$\lvert \beta_4 \rvert - \lvert \beta_3 \rvert > 0$ *(Two-tailed F test)*		**9.08*** **		**5.29** **
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
adj. R^2	0.829	0.830	0.623	0.620
Observations	3,041	3,041	3,041	3,041

Notes: All variables are defined in Appendix A. This table reports the results from running equations (1) and (2) after omitting firms that use time vesting share-based contracts in any year over the period 2005-2018. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

5.3.2. *Robustness check*

Following the approach of Lipe (1990), we rerun the models in equations (1) and (2) using two-years' and three-years' forward net income and operating cash flows as dependent variables. We also rerun the regressions using the aggregate two-years' and three-years' ahead net income and operating cash flows. The results of these robustness checks are reported in tables 9 and 10 and confirm the main findings in this paper.

Because firms voluntarily decide the structure of their compensation, our results might be influenced by this self-selection bias. For the first hypothesis, our sample firms include only those who report SBCE in their financial statements; therefore, they may not constitute a random selection of listed firms in the UK. This raises concerns about the missing observations related to firms that do not use share-based compensation schemes and report SBCE in their accounts. To address such concerns, we follow prior accounting literature, such as Hung and Subramanyam (2007) and implement the two-stage regression procedure suggested by Heckman (1979). In the first stage, we include observations related to all listed firms in the UK over our sample period (4,232 firm-year observations) and run a probit model to calculate

Table 9. Results using NI_{it+2} *and* NI_{it+3} separately and using aggregated ($NI_{it+1} + NI_{it+2}$) *and* ($NI_{it+1} + NI_{it+2} + NI_{it+3}$).

	*H*1				*H*2			
variables:	$Adj.\ NI_{it+2}$	$Adj.\ NI_{it+3}$	$\sum_{a=1}^{a=2} Adj.\ NI_{it+a}$	$\sum_{a=1}^{a=3} Adj.\ NI_{it+a}$	$Adj.\ NI_{it+2}$	$Adj.\ NI_{it+3}$	$\sum_{a=1}^{a=2} Adj.\ NI_{it+a}$	$\sum_{a=1}^{a=3} Adj.\ NI_{it+a}$
$Adj.\ NI_{it}$	0.505***	0.446***	0.556***	0.654***	0.497***	0.444***	0.552***	0.654***
	(6.66)	(5.58)	(7.10)	(4.87)	(6.34)	(5.37)	(7.29)	(4.99)
$Other\ employee\ compensations_{it}$ (a_2)	0.465***	0.544***	1.201***	2.081***	0.480***	0.555***	1.219***	2.101***
	(5.47)	(6.24)	(11.22)	(10.96)	(5.50)	(6.15)	(11.83)	(11.29)
$SBCE_{it}$ (a_3)	4.671***	5.966***	4.671***	5.966***				
	(3.34)	(3.71)	(3.34)	(3.71)				
$Equity\ Settled_{it}$ (β_3)					3.569**	4.616***	6.803***	9.352*
					(2.42)	(2.59)	(2.77)	(1.94)
$Cash\ Settled_{it}$ (β_4)					24.46***	24.86**	38.67***	50.85**
					(3.62)	(2.58)	(3.48)	(2.31)
$Size_{it}$	−0.001	−0.007	0.022	0.018	−0.003	−0.008	0.019	0.016
	(−0.09)	(−0.44)	(0.77)	(0.35)	(−0.25)	(−0.51)	(0.70)	(0.32)
MB_{it}	0.021***	0.022***	0.031***	0.051***	0.020***	0.021***	0.029***	0.049***
	(3.82)	(3.50)	(3.05)	(2.75)	(4.01)	(3.69)	(3.19)	(2.86)
$Liquidity_{it}$	0.130***	0.115*	0.257	0.440	0.114**	0.099	0.232	0.406
	(2.74)	(1.81)	(1.15)	(1.33)	(2.37)	(1.56)	(1.03)	(1.21)
Constant	0.012	0.086	0.206	0.403	0.043	0.112	0.250	0.455
	(0.11)	(0.64)	(0.65)	(0.80)	(0.43)	(0.85)	(0.79)	(0.89)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.740	0.703	0.754	0.736	0.742	0.705	0.755	0.737
Observations	3,683	3,325	3,683	3,325	3,683	3,325	3,683	3,325
$\|a_3\| - \|a_2\| > 0$ ***(Two-tailed F test)***	**12.74*** **	**15.73*** **	**17.11*** **	**9.74*** **				
$\|\beta_4\| - \|\beta_3\| > 0$ ***(Two-tailed F test)***					**8.75*** **	**3.86** **	**7.62*** **	**3.31***

Notes: All variables are defined in Appendix A.This table reports the results from running equations (1) and (2) using NI_{it+2} *and* NI_{it+3} separately, and then using aggregated ($NI_{it+1} + NI_{it+2}$) *and* ($NI_{it+1} + NI_{it+2} + NI_{it+3}$) as alternative measures of firm future performance. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

Table 10. Results using CFO_{it+2} *and* CFO_{it+3} separately and using aggregated ($CFO_{it+1} + CFO_{it+2}$) *and* ($CFO_{it+1} + CFO_{it+2} + CFO_{it+3}$).

	*H*1				*H*2			
variables:	$Adj.\ CFO_{it+2}$	$Adj.\ CFO_{it+3}$	$\sum_{a=1}^{a=2} Adj..CFO_{it+a}$	$\sum_{a=1}^{a=3} Adj.\ CFO_{it+a}$	$Adj.\ CFO_{it+2}$	$Adj.\ CFO_{it+3}$	$\sum_{a=1}^{a=2} Adj.\ CFO_{it+a}$	$\sum_{a=1}^{a=3} Adj.\ CFO_{it+a}$
$Adj.\ NI_{it}$	0.152*	0.149*	0.240*	0.336*	0.209***	0.214**	0.238*	0.334*
	(1.89)	(1.70)	(1.79)	(1.72)	(2.73)	(2.49)	(1.83)	(1.76)
Other employee compensations$_{it}$ (a_2)	0.864***	0.884***	1.746***	2.689***	0.851***	0.866***	1.769***	2.723***
	(8.94)	(7.70)	(9.82)	(9.21)	(8.91)	(7.54)	(10.01)	(9.37)
$SBCE_{it}$ (a_3)	5.252**	5.896**	10.97**	17.20**				
	(2.34)	(2.29)	(2.51)	(2.41)				
Equity Settled$_{it}$ (β_3)					−0.205	−0.116	7.868	12.19
					(−0.07)	(−0.04)	(1.65)	(1.54)
Cash Settled$_{it}$ (β_4)					27.02***	27.82**	51.29***	81.31**
					(2.82)	(2.40)	(2.67)	(2.50)
$Size_{it}$	0.083**	0.080**	0.185***	0.279**	0.087**	0.087**	0.182**	0.276**
	(2.40)	(2.12)	(2.62)	(2.46)	(2.51)	(2.29)	(2.58)	(2.44)
MB_{it}	0.0202**	0.023**	0.034**	0.052**	0.020**	0.024***	0.032**	0.049**
	(2.25)	(2.45)	(2.03)	(2.04)	(2.50)	(2.73)	(2.10)	(2.12)
$Liquidity_{it}$	0.096	0.134	0.191	0.400	0.068	0.103	0.156	0.342
	(0.58)	(0.82)	(0.59)	(0.86)	(0.41)	(0.63)	(0.48)	(0.73)
Constant	−0.229	−0.233	−0.581	−0.961	−0.211	−0.228	−0.522	−0.873
	(−0.78)	(−0.75)	(−0.99)	(−1.05)	(−0.72)	(−0.73)	(−0.89)	(−0.95)
Industry fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.619	0.597	0.646	0.643	0.618	0.595	0.648	0.645
Observations	3,683	3,325	3,683	3,325	3,683	3,325	3,683	3,325
$\|a_3\| - \|a_2\| > 0$ ***(Two-tailed F test)***	**7.51*** **	**7.01*** **	**8.63*** **	**7.85*** **				
$\|\beta_4\| - \|\beta_3\| > 0$ ***(Two-tailed F test)***					**7.02*** **	**5.35** **	**4.52*** **	**3.99** **

Notes: All variables are defined in Appendix A. This table reports the results from running equations (1) and (2) using CFO_{it+2} *and* CFO_{it+3} separately, and then using aggregated ($CFO_{it+1} + CFO_{it+2}$) *and* ($CFO_{it+1} + CFO_{it+2} + CFO_{it+3}$) as alternative measures of future firm performance. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

Table 11. Results after controlling for self-selection bias using Heckman's estimation.

Panel A: First stage *(H1)*

Prob model(1): Select$_{it}$ = $\alpha_0 + \alpha_1$SBCE Ratio_IndAvg$_{it}$ + $\alpha_2 Size_{it} + \alpha_3 MB_{it} + \alpha_4 Liquidity_{it}$ + *IND FE* + *YEAR FE* + e_{it}

	Constant	*SBCE Ratio_IndAvg*	*Size*	*MB*	*Liquidity*	*Observations*	Pseudo R^2
Coeff	0.092	3.045***	−0.033	−0.031*	−0.178	4,232	0.626
	(0.11)	(11.24)	(−0.33)	(−1.77)	(−0.68)		

Panel B: First stage *(H2)*

Prob model (2): Select$_{it}$ = $\alpha_0 + \alpha_1 Cash\ Settled\ Ratio\_IndAvg_{it} + \alpha_2 Size_{it} + \alpha_3 MB_{it} + \alpha_4 Liquidity_{it}$ + *IND FE* + *YEAR FE* + e_{it}

	Constant	*Cash Settled Ratio_IndAvg*	*Size*	*MB*	*Liquidity*	*Observations*	Pseudo R^2
Coeff	−3.80***	10.765***	0.253***	0.012	−0.021	3,819	0.443
	(−10.30)	(9.18)	(6.56)	(1.11)	(−0.10)		

Panel C: Regression models

	H1		*H2*	
	Adj. NI$_{it+1}$	*Adj. CFO*$_{it+1}$	*Adj. NI*$_{it+1}$	*Adj. CFO*$_{it+1}$
Adj. NI$_{it}$	0.610***	0.117	0.611***	0.117
	(9.58)	(1.46)	(9.38)	(1.50)
Other employee compensations$_{it}$ (a_2)	0.383***	0.893***	0.392***	0.904***
	(5.58)	(9.86)	(5.60)	(10.12)
SBCE$_{it}$ (a_3)	4.529***	5.503***		
	(4.43)	(2.69)		
Equity Settled$_{it}$ (β_3)			3.251***	3.836*
			(3.10)	(1.74)
Cash Settled$_{it}$ (β_4)			20.70***	29.38***
			(3.60)	(2.63)
Size$_{it}$	0.007	0.113***	0.012	0.133***
	(0.77)	(3.65)	(1.13)	(4.02)
MB$_{it}$	0.013***	0.016**	0.013***	0.016**
	(3.46)	(2.10)	(3.68)	(2.34)
Liquidity$_{it}$	0.089***	0.026	0.078**	0.013
	(2.75)	(0.15)	(2.42)	(0.07)
Inverse Mills Ratio$_{it}$ *(Mills 1)*	−0.003	−0.159		
	(−0.05)	(−1.48)		
Inverse Mills Ratio$_{it}$ *(Mills 2)*			0.026	0.088
			(0.69)	(1.31)
Constant	−0.059	−0.407	−0.132	−0.711**
	(−0.78)	(−1.45)	(−0.98)	(−2.10)
$\lvert a_3 \rvert - \lvert a_2 \rvert > 0$ *(Two-tailed F test)*	**21.12*** **	**9.81*** **		
$\lvert \beta_4 \rvert - \lvert \beta_3 \rvert > 0$ *(Two-tailed F test)*			**8.82*** **	**4.91** **
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
adj. R^2	0.821	0.639	0.822	0.641
Observations	3,819	3,819	3,819	3,819

Notes: All variables are defined in Appendix A.This table reports the results from running equations (1) and (2) over the period 2005–2018 and after controlling for self-selection bias using Heckman's (1979) approach. In Panel A, we include observations for firms that do not report SBCE. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

the inverse Mills ratio (*Mills 1*). The dependent variable in this model is a dummy variable equal to 1 if a firm uses share-based compensation in a particular year, and 0 otherwise. Following the approach of An et al. (2016), Adwan et al. (2022) and Kuang et al. (2022), we use the industry average of the proportion of SBCE to total employee compensation expenses as the main instrument variable that is likely to be correlated with the likelihood of reporting SBCE, but is less likely to directly affect the future performance of a particular firm. We anticipate an increase in the likelihood of using share-based compensation when a firm exists in an industry that uses share-based compensation intensively.

Another selectivity issue arises in the sample used for testing the second hypothesis. For this test, we include firms that report SBCE in their financial statements and set cash settled SBCE to 0 when a firm does not report cash settled expenses. Cash settled-based compensation may be triggered by other ex-ante firm policies, and thus the decision to offer schemes with cash settlement becomes self-selecting. To ensure that our inference is not affected by this potential self-selection bias, we implement a treatment-effects model based on the Heckman (1979) two-stage procedures. Specifically, we hold the sample constant and endogenise a firm's choice to use cash settled compensation schemes, and therefore report cash settled SBCE. The industry average of the proportion of cash settled SBCE to total SBCE is used as our main identification variable to calculate the inverse Mills ratio (*Mills 2*) in the first stage.

Both first-stage models also include the three main control variables used in equations (1) and (2). We include the inverse Mills ratios obtained from the first-stage models as controls in equations (1) and (2). The results reported in Table 12 are consistent with the main regressions presented in Table 3 (Panel A). The coefficients on the inverse Mills ratios 1 and 2 are not statistically significant, indicating that potential selection bias in both hypotheses is not a major issue.

It is important to note that our main models include the lagged value of dependent variable as an independent variable. This approach is used by prior research to reduce concerns about endogeneity (e.g. Wintoki et al. 2012).[22] We further alleviate concerns about endogeneity and omitted variables using the two-step 'system GMM' approach (Blundell and Bond 1998), which jointly estimates the dynamic regression specification in both differences and levels.[23] We employ internal instruments, specifically all the endogenous right-hand-side variables in the model. The lagged levels dated t−2 to t−3 are used to instrument the regression in differences, while lagged differences dated t−1 are used to instrument the regression in levels (Hasan and Habib 2023). In an untabulated analysis, we observe that our findings continue to hold.

In equations (1) and (2), we control for size, growth opportunity, and liquidity. As a further robustness check and to ensure that our results are valid across the different behaviour of independent variables that potentially affect future firm performance, we include additional control variables. Following Schiemann and Guenther (2013), we include *Capital Intensity*,

[22]The implicit assumption behind this approach is that the endogenous part of the explanatory variable disappears over time, while the exogenous part persists.

[23]Controlling for omitted variables (such as culture and image) can be accomplished using the conventional firm-fixed effect method. However, because our main models contain lagged dependent variables, using the firm-fixed effect might lead to serious estimation problems as the lagged value of the dependent variable is mechanically correlated with past realisations of the error term (see Wooldridge 2010). The 'system GMM' estimator offers a solution to the autocorrelation concern while reducing the effects of omitted variables. It is also useful for dealing with the endogeneity that might exist in our study between SBCE and firm performance, particularly when no obvious external instruments are available (Arellano and Bond 1991). Moreover, as suggested by Blundell and Bond (1998), including the regression in levels can lead to a marked improvement over the widely used 'difference GMM estimator', especially when there is substantial persistence in the explanatory variables.

Table 12. Results using additional controls.

	Adj. NI_{it+1}		*Adj. CFO_{it+1}*	
	H1	*H2*	*H1*	*H2*
Adj. NI_{it}	0.603***	0.604***	0.121*	0.124*
	(9.20)	(9.10)	(1.67)	(1.71)
Other employee compensations$_{it}$ (a_2)	0.397***	0.404***	0.879***	0.888***
	(5.53)	(5.57)	(9.85)	(10.03)
$SBCE_{it}$ (a_3)	4.653***		5.611***	
	(4.46)		(2.75)	
Equity Settled$_{it}$ (β_3)		3.430***		3.918*
		(3.25)		(1.75)
Cash Settled$_{it}$ (β_4)		19.30***		25.05***
		(4.15)		(2.88)
$Size_{it}$	0.005	0.005	0.095***	0.095***
	(0.62)	(0.58)	(3.01)	(2.99)
MB_{it}	0.014***	0.013***	0.016**	0.016**
	(3.61)	(3.78)	(2.29)	(2.41)
Liquidity$_{it}$	0.084***	0.076**	0.037	0.025
	(2.65)	(2.37)	(0.21)	(0.14)
Capital Intensity$_{it}$	0.070	0.082	0.305	0.322
	(1.02)	(1.16)	(1.24)	(1.35)
Operating Cycle$_{it}$	−0.022	−0.003	0.030	0.057
	(−0.23)	(−0.03)	(0.08)	(0.15)
Operating Cycle dummy$_{it}$	−0.008	−0.003	0.051	0.057
	(−0.33)	(−0.15)	(0.63)	(0.69)
Intangible Intensity$_{it}$	−0.317*	−0.187	−0.253	−0.084
	(−1.95)	(−1.10)	(−0.49)	(−0.16)
Intangible Intensity dummy$_{it}$	−0.027	−0.016	0.097	0.111
	(−0.88)	(−0.52)	(0.90)	(1.03)
Constant	−0.020	−0.036	−0.585	−0.606
	(−0.17)	(−0.31)	(−1.06)	(−1.10)
$\lvert a_3 \rvert - \lvert a_2 \rvert > 0$ *(Two-tailed F test)*	**21.58*****		**10.24*****	
$\lvert \beta_4 \rvert - \lvert \beta_3 \rvert > 0$ *(Two-tailed F test)*		**11.49*****		**5.35****
Industry fixed effect	Yes	Yes	Yes	Yes
Year fixed effect	Yes	Yes	Yes	Yes
adj. R^2	0.821	0.821	0.642	0.643
Observations	3,819	3,819	3,819	3,819

Notes: All variables are defined in Appendix A.This table reports the results from running equations (1) and (2) using additional control variables over the period 2005-2018. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

measured by property, plant, and equipment at net book value divided by total assets and *Operating Cycle*, captured by the natural logarithm of the sum of the days it takes a firm to sell inventory and the days to collect the cash from its trade receivables. For financial services firms, *Operating Cycle* is set to equal 0. We also included an *Operating Cycle dummy* as a binary variable equal to 1 for observations for which we set the value to 0, and 0 otherwise. We also control for *Intangible Intensity* measured as R&D expenses divided by net sales. Missing values for R&D expenses are set to 0. We also include an *Intangible Intensity dummy* as a binary variable which equals 1 for observations for which R&D expenses are not reported,

Table 13. Results using firms that employ cash settled-based compensations.

	Adj. NI_{it+1} *H2*	*Adj. CFO_{it+1}* *H2*
Adj. NI_{it}	0.544***	0.301***
	(8.66)	(3.99)
Other employee compensations$_{it}$ (β_2)	0.526***	−0.235**
	(7.71)	(−2.39)
Equity Settled$_{it}$ (β_3)	3.367**	4.710***
	(2.11)	(3.07)
Cash Settled$_{it}$ (β_4)	21.82***	21.48***
	(3.84)	(3.66)
Size$_{it}$	0.036	0.119**
	(1.36)	(2.20)
MB$_{it}$	0.022**	0.011
	(2.37)	(0.96)
Liquidity$_{it}$	0.108	0.231
	(1.01)	(1.37)
Constant	−0.419	−0.969*
	(−1.63)	(−1.89)
$\|\beta_4\| - \|\beta_3\| > 0$ *(Two-tailed F test)*	**8.69*** **	**7.55*** **
Industry fixed effect	Yes	Yes
Year fixed effect	Yes	Yes
adj. R^2	0.781	0.426
Observations	740	740

Notes: All variables are defined in Appendix A. This table reports the results from running equations (1) and (2) over the period 2005–2018 using firms that employ cash settled-based compensations. All the selected firms also employ equity settled-based compensations. *, **, *** indicate statistical significance at 0.10, 0.05, and 0.01 levels (two-tailed), respectively. The t-statistics are estimated using standard errors clustered at the firm level.

and 0 otherwise. Table 12 reveals that our findings continue to hold after including all the above control variables.[24]

Furthermore, because we set cash settled SBCE to 0 when firms do not use cash settled-based compensation, our design for testing the second hypothesis might underestimate the economic usefulness of cash settled-based expenses. We therefore run an additional sensitivity test to alleviate this. Specifically, we re-estimate equation (2) using observations of firms that use cash settled-based compensation.[25] The results presented in Table 13 show that our main findings continue to hold.

Finally, given that observations within a specific year are unlikely to be independently distributed, we rerun our main analysis using double cluster standard errors by firm and year. We also re-estimate our main models after omitting observations that fall in the financial sector and in the global financial crisis period (2007–2008). The untabulated results show that our main findings continue to hold.

6. Concluding remarks and implications

This paper examines the ability of SBCE to provide information that helps to predict future firm performance. In particular, it investigates whether the predictive ability of SBCE is higher than that of other employee compensation expenses. The paper also evaluates whether SBCE

[24]We also run regressions using the additional control variables separately. Our results continue to hold.
[25]All sample firms that report cash settled SBCE in their income statements also report equity settled SBCE.

classified as cash settled (adjusted fair value) has more predictive ability than equity settled SBCE (unadjusted fair value).

Calculated using the fair value approach under IFRS 2, SBCE provides information on future performance targets included in compensation contracts and on the likelihood of achieving these targets. Moreover, SBCE arises from compensation schemes used to incentivise senior management to improve future firm performance. In comparison, other compensation expenses, though potentially associated with future performance, are mainly incurred as rewards for past actions. We therefore expect SBCE to have greater predictive ability than other employee compensation expenses. Indeed, we find robust evidence indicating that for a sample of UK listed firms, the ability to predict future performance is higher for SBCE. We also find that the predictive ability of SBCE classified as cash settled is higher than that of SBCE classified as equity settled. The recognised expense of cash settled SBCE is subject to more flexible accounting treatment as it must be updated at each reporting period until the settlement date, whereas this is not the case with equity settled. Such fair value-based adjustments reflect managers' updated assessments of companies' prospects. The additional analyses indicate that our results are more pronounced for firms with incentives to provide high-quality financial reporting and those with strong corporate governance. Overall, our findings suggest that managers use the discretion permitted in IFRS 2 to report share-based compensation estimates that help in predicting future firm performance.

We perform a sequence of checks to ensure the robustness of our results. The main results continue to hold when we use two – and three-years' ahead earnings and cash flows, add further control variables, control for self-selection bias using the Heckman (1979) two-stage procedure, implement GMM through the Arellano-Bond Dynamic Panel-Data estimation technique, apply double cluster standard errors by firm and year, and rerun our analysis using only observations where firms report both cash and equity settled SBCE. The results also remain virtually the same when we disaggregate other compensation expenses into components and when exclude financial firms, firms with restricted share plans and observations that fell in the global financial crisis period.

The findings of this paper have implications for accounting standard setters and users of financial statements. The results support the IASB's view that the mandatory recognition of SBCE under IFRS 2 provides users of financial statements with information that is useful for predicting future performance. Furthermore, they suggest that the IFRS 2 requirement to regularly update cash settled-based compensation expense enhances the predictive ability of earnings for future firm performance; hence, we recommend that the same accounting treatment be extended to equity settled expense. This is consistent with the call to improve the accounting treatment of performance-based compensation (e.g. Core 2020, Smith 2020, Wallington et al. 2021, Zyl and Uliana 2022).

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Appendix A Variable definitions

Variable	Definition	Source
$Adj.\ NI_{it}$	The current net income plus the total employee compensation expenses for firm *i* in year *t* measured on a per share basis.	Refinitiv Datastream
$Adj.\ CFO_{it}$	The net cash flows arising from operating activities plus the total employee compensation expenses for firm *i* in year *t* measured on a per share basis.	Refinitiv Datastream
$Other\ employee\ compensations_{it}$	The total employee compensation expenses minus SBCE for firm i in year t measured on a per share basis.	Annual report
$SBCE_{it}$	The total recognised share-based compensation expense for firm *i* in year t measured on a per share basis.	Annual report
$Equity\ Settled_{it}$	The recognised equity settled SBCE for firm *i* in year *t* measured on a per share basis.	Annual report
$Cash\ Settled_{it}$	The recognised cash settled SBCE for firm *i* in year *t* measured on a per share basis.	Annual report
$Size_{it}$	The natural logarithm of the total assets for firm *i* in year *t*.	Refinitiv Datastream
MB_{it}	The ratio of market to book value of equity for firm *i* in year *t*.	Refinitiv Datastream
$Liquidity_{it}$	A dummy variable equal to 1 if a firm *i* pays dividends for shareholders in year *t*, and 0 otherwise.	Refinitiv Datastream
$Capital\ Intensity_{it}$	Property, plant, and equipment at net book value divided by total assets for firm *i* in year *t*.	Refinitiv Datastream
$Operating\ Cycle_{it}$	The natural logarithm of sum of the days it takes a firm *i* to sell inventory and the days to collect the cash from its trade receivables in year *t*. For financial services firms, Operating Cycle is set to equal 0.	Refinitiv Datastream
$Operating\ Cycle\ dummy_{it}$	A binary variable equal to 1 for observations for which we set the value to 0, and 0 otherwise.	Refinitiv Datastream
$Intangible\ Intensity_{it}$	Research and development expenses divided by net sales for firm *i* in year *t*. Missing values for research and development expenses are set to 0.	Refinitiv Datastream
$Intangible\ Intensity\ dummy_{it}$	A binary variable which equals 1 for observations for which research and development expenses for firm *i* in year *t* are not reported, and 0 otherwise.	Refinitiv Datastream
$SBCE\ Ratio\_IndAvg_{it}$	The industry average ratio of SBCE to total employee compensation expenses in year *t*.	Annual report
$Cash\ Settled\ Ratio\_IndAvg_{it}$	The industry average ratio of *Cash Settled* SBCE to total SBCE in year *t*.	Annual report