Can the Stock Market Capitalize R&D Expenditures?*

(*when firms aren't mandated to)

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Abstract

We examine the UK stock market's valuation of firms' R&D expenditures around the time of the switch from UK GAAP to IFRS in 2006. Under both regimes, research expenditures and development expenditures that did not meet capitalization conditions must be expensed. Under UK GAAP, firms had the option to expense or capitalize development expenditures that met capitalization conditions. Thus, there were *mandatory* expensers (who did not have capitalization-eligible R&D expenditures), and *voluntary* expensers (who had capitalization-eligible R&D expenditures, but chose to expense them). The distinction between the different expenditures is important, because as theory predicts and as we show, capitalization-eligible R&D expenditures have a higher market valuation than ineligible expenditures. Under IFRS, such eligible expenditures must be capitalized, so voluntary expensers were required to reveal their type. We find that under UK GAAP, the UK stock market valued the R&D expenditures of both mandatory and voluntary expensers equally; R&D of voluntary expensers was valued more highly only under IFRS. Thus, without mandatory capitalization revealing firms' types, the market was not able to properly value firms' R&D expenditures.

1. Introduction

We investigate whether the stock market can distinguish firms whose R&D expenditures are eligible for capitalization, from firms whose R&D expenditures are not, when firms expense all of their R&D expenditures. Our research question is important, because as theory predicts and as we show, capitalized expenditures are more valuable (have a greater return response coefficient) than expensed expenditures. This is as predicted, because capitalized costs are closer to fruition and more certain to produce benefits, by definition. Thus, firms that have capitalization-eligible R&D expenditures have more valuable R&D than firms that don't, but this is not revealed when all R&D is expensed. We seek to know if the market is capable of accurately valuing R&D firms, without capitalization. That is, does expensing all R&D expenditures result in a pooling or a separating equilibrium (Spence, 1978)? Our investigation is particularly applicable to markets like the U.S, where expensing R&D is mandated and no additional disclosures are required (except for the Software Development, SFAS 86).

Our setting is the UK capital market around the time of its switch from UK GAAP to IFRS in 2006. The UK is particularly interesting for our purposes for two reasons. First, under UK GAAP, research expenditures, and development expenditures that did not meet the capitalization conditions, must be expensed, but firms had the option to expense or to capitalize development expenditures that met the conditions (detailed in Section 3). Thus, there were two types of firms that expensed all of their R&D expenditures: *mandatory* expensers, who only had research expenditures or whose development expenditures did not meet the capitalization conditions; and, *voluntary* expensers, who had capitalization-eligible development expenditures, but chose to expense them. Under IFRS, while mandatory expensers continued to expense all of their R&D expenditures, voluntary expensers were now required to capitalize their eligible

development expenditures, disclosing both the expensed and capitalized components of their R&D expenditures.[1] Thus, they were forced to reveal that they had capitalizable expenditures. Figure 1 shows the pooling of both groups of expensers under UK GAAP, and the subsequent separation under IFRS. We refer to the two groups as *mandatory expensers* and *voluntary expensers*, respectively.[2]

Second, it is widely agreed that the U.K.'s capital market is the most comparable to the U.S'. For example, Michaely and Roberts (2012) note that U.K. has an economic environment that shares many similarities to that found in the U.S. Acharya, Sundaram, and John (2011) note that the financial systems in the U.K. and U.S. are similar. Allen, Carletti, and Marquez (2009) also note that systems of corporate governance in the U.S. and U.K. are very similar. Since the two countries have similar institutions, accounting and legal frameworks, among others, the U.K. results act as a benchmark for what U.S. results with R&D capitalization might be. As Chen, Gavious, and Lev (2017) point out, R&D accounting is "one of the most pronounced differences between US GAAP and IFRS" and it is important for U.S. regulators to see the effects of R&D capitalization in a major capital market. Thus, our results can serve as a basis for evidence-based policymaking (Leuz, 2018) in the U.S.

We find that under UK GAAP, the market valued the R&D expenditures of mandatory and voluntary expensers equally; i.e., the market could not separate the two groups of firms, and there was a pooling equilibrium. Only once voluntary expensers were required to reveal their

[1] Firms do not have to disclose the breakdown of their R&D expenditures between R vs D, and it is rarely done. Since development expenditures that don't meet the capitalization conditions must be expensed just like research, there is not a direct connection between expensed vs capitalized costs on the one hand, and research vs development on the other hand.

[2] There were also some firms that voluntarily capitalized eligible development expenditures under UK GAAP. Although they are not our main focus, we include these firms in some of our tests. We refer to these firms as *capitalizers*.

type under IFRS, did the market value their R&D expenditures more highly than mandatory expensers', thereby separating the two groups. In other words, without the information provided by capitalization, the market could not distinguish firms with more valuable vs less valuable R&D expenditures. Consistent with the revelation of the R&D's value, we show that both the Future Earnings Response Coefficient (FERC) and the leverage of voluntary expensers increased relative to those of mandatory expensers, in the switch from UK GAAP to IFRS.

Finally and importantly, we show that real economic changes, such as a change in the composition of voluntary expensers' R&D expenditures to more highly-valued D and less low-valued R, did not drive the valuation change; i.e., it was due to a change in financial reporting that revealed new information to the market. Thus, mandating capitalization had real valuation consequences.

We proceed as follows. As a first step to establish the relative value of capitalized vs expensed R&D, we regress contemporaneous annual stock returns against earnings before R&D expense and changes in earnings before R&D (NIRD and CHG_NIRD, as control for performance), and the expensed and capitalized portions of R&D expenditures, for voluntary expensers under IFRS. As hypothesized, we find that capitalized costs have a greater response coefficient than expensed costs; i.e., capitalized costs are more highly valued by the market.[3]

Next, using the mandatory vs voluntary expenser identities that became known under IFRS, we regress annual stock returns against NIRD and CHG_NIRD and the *total* R&D expenditure (i.e., expensed plus capitalized costs), separately for both groups, for the last 3 years under UK GAAP and the first 3 years under IFRS. We refer to the coefficient on R&D

[3] We cannot estimate this regression for voluntary expensers under UK GAAP or Mandatory Expensers under either regime, since these firms did not have any capitalized expenditures.

expenditures as the *R&D response coefficient*. We find that under UK GAAP, the R&D response coefficient is similar (and statistically indistinguishable) for both groups. This indicates that the market could not separate them, and a pooling equilibrium existed. Under IFRS, once their types were revealed, voluntary expensers had a higher R&D response coefficient. Since we use the exact same firms over equal 3 year windows, our insignificant results under UK GAAP cannot be due to low power or some other econometric problems, and are almost certainly the result of the change in financial reporting revealing new information.

Next, we examine how each group's Future Earnings Response Coefficient changed from UK GAAP to IFRS. FERC, the coefficient on future earnings, in a regression of current returns on current and future earnings, captures the amount of future earnings information capitalized into current returns, higher FERC indicating more information (Gelb and Zarowin 2002, Lundholm and Myers 2003, Durnev, et al, 2003). Consistent with our R&D response coefficient results, we find that voluntary expensers experienced an increase in FERC relative to mandatory expensers, which indicates that capitalization revealed information that the stock market previously did not know.

Finally, although not our primary focus, we examine the impact of the change in financial reporting on firms' leverage. Lim, Macias, and Moeller (2020) find a positive relation between firms' identifiable intangible assets and leverage. They argue that such intangibles, like tangible assets, have features that may support debt, such as their separate identifiability and link to future cash flows. Analogously, by definition capitalizing R&D indicates that future cash flows from the R&D project are more certain, thereby enabling increased leverage. Consistent with this, we find that voluntary expensers, when they began to capitalize R&D expenditures under IFRS, increased their leverage relative to mandatory expensers.

Together, our results show that voluntary disclosure was not sufficient; without mandatory capitalization, the market did not have enough information to accurately value firms' R&D expenditures, and capitalization revealed new information to the market. More generally, our evidence points to the importance of disclosure regulation (Leuz and Wysocki, 2016).

The rest of the paper is organized as follows. Section 2 reviews the literature on R&D capitalization. Section 3 describes our sample and data, while Section 4 discusses our hypotheses and tests. Section 5 discusses our results. Section 6 concludes.

2. Literature Review

Because most R&D research is conducted with U.S. data, and all U.S. firms except those in the software industry must expense their R&D costs, interest in R&D accounting has been devoted primarily to comparing the valuation relevance of actual R&D expenses (expenditures) to *estimates of what they would be* under capitalization, and to whether the U.S. stock market efficiently values R&D firms. The exceptions deal with either foreign settings where capitalization is allowed or mandated, or with software firms in the U.S., which after the introduction of SFAS 86 in 1985, could choose to capitalize software development costs.[4] Most important, no previous papers address the issue of whether the market could infer unrecognized capitalization under expensing; i.e., whether mandating capitalization reveals new information.

A robust result in research with U.S. data is that despite all R&D costs being expensed for accounting purposes, the stock market capitalizes R&D costs on its own (Sougiannis 1994, Lev and Sougiannis 1996, Chambers, Jennings, and Thompson 1998). For example, firms with high R&D expenditures have high market-to-book ratios, and capitalization-adjusted book values are

[4] As Mohd (2005) discusses, SFAS 86 allows enough flexibility so that capitalization is *de facto* optional.

more closely related to stock market values than actual book values, indicating that market values of R&D firms reflect assets that are missing from their accounting book values. However, all studies with U.S. data assume 100% capitalization and a life of five years (Chan et al. 2001; Falato et al. 2022), so these studies are unable to determine the market's ability to distinguish capitalizable vs non-capitalizable costs.[5] More important, the fact that the market recognizes that (at least some of) expensed R&D should be capitalized does not imply that the market can distinguish firms with more valuable vs less valuable R&D.

Among studies with foreign data, Oswald and Zarowin (2007) and Oswald (2008) study R&D capitalization vs expensing in the UK before IFRS (i.e., under UK GAAP). Oswald and Zarowin (2007) compare FERC for R&D expensers (firms that expensed all of their R&D expenditures) vs capitalizers (firms that capitalized their eligible development expenditures) under UK GAAP. They find that capitalizers had higher FERC, which they interpret as capitalization providing more information to the market about future earnings. However, they do not distinguish between voluntary vs mandatory expensers, but instead view them as one. Additionally, Oswald and Zarowin (2007) study only the UK GAAP period, when capitalization of eligible development expenditures was voluntary; thus, there was a self-selection of capitalizers vs expensers, and some unobservable firm characteristic, rather than capitalization per se, might have been responsible for capitalizers' higher FERC. Oswald (2008) finds that the value-relevance of capitalized vs expensed R&D is similar under UK GAAP. He also finds that there are differences between voluntary vs mandatory expensers, but like Oswald and Zarowin (2007), he does not compare the two types of expensers with each other.[6]

[5] Lev and Sougiannis (1996) estimate industry specific R&D capitalization, while Iqbal, Rajgopal, Srivastava, and Zhao (2024) use an industry-year-specific basis.
[6] Since Oswald's (2008) sample was before IFRS, he must approximate voluntary and mandatory expensers.

Like us, both Oswald, Simpson, and Zarowin (2022) and Oswald, Ryu, and Zarowin (2023) use the setting of the UK's switch from UK GAAP to IFRS in 2005 to study the R&D related behavior of voluntary expensers (which they refer to as "Switchers", since they switched from expensing under UK GAAP to capitalizing under IFRS). Oswald et al (2022) find that Switchers increased their R&D expenditures around the time of the switch, presumably because of capitalization's expense deferral, which allowed both increased R&D expenditures and higher profits. Oswald et al (2023) find that Switchers reduced their use of R&D cuts (real earnings management) to meet earnings benchmarks, because reductions in R&D expenditures no longer have the same profit boost under capitalization. While both papers find that change in accounting rule had real effects, neither paper investigates whether the market could infer the relative profitability of R&D projects without mandatory capitalization.

Aboody and Lev (1998) and Mohd (2005) study U.S. software firms, where capitalization of development costs is allowed for projects that pass the feasibility test under SFAS 86. Even apart from any differences due to the IFRS mandate vs GAAP's optional capitalization, these papers are fundamentally different from ours. Aboody and Lev (1998) examine whether the amount of the R&D expenditure that is capitalized, the amount that is expensed, and the periodic amortization, are associated with both current and future earnings and with future returns. Overall, they find that these variables are "value relevant", and that capitalized costs have a higher association with returns than expensed costs.

Mohd finds that after the introduction of SFAS 86, information asymmetry, as measured by bid-ask spreads and share turnover, decreased for software firms relative to other R&D firms (which must expense), and that among software firms, capitalizers have lower information asymmetry than expensers. He interprets these results as evidence of capitalization's information

benefit, due to the additional recognition. However, Mohd finds that information asymmetry decreased for both capitalizers and expensers (again, relative to other R&D firms). This is not surprising, since the choice to capitalize or not revealed new information regardless of which option a firm chose. Mohd also compares the information asymmetry of software capitalizers vs software expensers under SFAS 86; he finds that capitalizers have lower information asymmetry, which he interprets as being caused by the capitalization information. Most important, neither Aboody and Lev (1998) or Mohd (2005) asks whether the market can distinguish software firms that have capitalizable costs vs those that don't.

This is crucial to know, because even if the capitalization information is value relevant, if the market could figure it out on its own, it is not necessary to mandate its recognition; i.e., if the information were already known, formal capitalization would not add new information to the market, and the information would not affect prices. As Healy, Myers, and Howe (2002) point out, theirs and all previous studies assume that the R&D accounting method does not affect economic values. However, if the market could not infer it, then the new information may affect share prices, and the case for mandatory capitalization becomes more compelling.

A number of U.S. studies such as Lev and Sougiannis (1996), Aboody and Lev (1998), Chan, Lakonishok, and Sougiannis (2001), Eberhart, Maxwell, and Siddique (2004), and Cohen, Diether, and Ma (2013) find that recognized R&D expenditures (expenses) predict excess returns; i.e., the stock market is (semi-strong form) inefficient with respect to R&D expenditures. However, Li (2011) and Lin and Wang (2016) find that R&D return predictability is due to a risk premium and not to market inefficiency (the famous Fama, 1970 joint test), so market efficiency with respect to R&D is an open question. While these papers investigate whether that the market is (in)efficient with respect to *recognized* R&D information, ours is the first paper to examine

whether the market can infer *unrecognized* R&D information. Thus, our tests are fundamentally different from any previous research on R&D accounting.

Importantly, our results hold whether or not the market is efficient with respect to recognized R&D information. This is because if the market is (semi-strong) efficient, but can't infer unrecognized information, then capitalization can make the market more efficient. If the market is not efficient, the additional capitalization information might make it efficient.

Two recent papers study the market's valuation of R&D expenditures under IFRS. Park, Lee, Baber, and Kang (2023) show that in Korea, firms that expense most of their R&D hold more cash and have lower leverage than firms that capitalize more, and SEOs are positively associated with capitalized R&D. Their results are consistent with ours that capitalized R&D is more valuable than expensed R&D (likely due to lower risk), but they do not test this. Campbell, Chen, Guan, and Ye (2023) use labor intensity as a proxy for R&D quality, and show that firms with greater labor intensity capitalize more R&D costs. Assuming the validity of their proxy, this is consistent with our result that capitalized costs are more valuable than expensed costs, although like Park et al (2023), they do not test this. Most important, neither Park et al (2023) nor Campbell et al (2023) asks whether the market can infer the valuation of firms' R&D under full expensing, and thus whether capitalization reveals new information.

Ours is the first paper to examine whether the market could infer which firms have the most valuable R&D expenditures, without mandatory capitalization. To address this question, we compare the market's valuation of voluntary vs mandatory expensers' R&D expenditures under UK GAAP, when both groups expensed, and under IFRS, when voluntary expensers capitalized eligible development expenditures. By doing so, we address the fundamental question in the debate between Skinner (2008a,b) and Lev (2008): whether a regime without mandatory

capitalization, such as the U.S. where full expensing is mandated, has negative capital market effects. Consistent with Lev, we find that the market undervalues capitalization-eligible development expenditures when they are expensed. Presaging our results, Lev writes "Capitalization thus conveys important inside information – success of the development program – to investors" (Lev, 2008). Inconsistent with Skinner, we find that voluntary disclosure does not solve this problem. The UK's switch to IFRS, mandating the capitalization of eligible development expenditures, provides the opportunity to address these important issues using archival data, in a major capital market, such that the results may be generalizable.

3. Data and Sample

Our sample consists of UK firms, because prior to the adoption of IFRS, UK GAAP permitted, but did not require, the capitalization and subsequent amortization of capitalize-eligible development expenditures [SSAP 13, para. 25, (1989)]. However, with the adoption of IFRS in 2005, capitalization of eligible development expenditures became mandatory. Specifically, IAS 38 (para. 57) states that an intangible development asset shall be recognized if the firm could demonstrate the following conditions: (a) The technical feasibility of completing the intangible asset so that it will be available for the use or sale; (b) its intention to complete the intangible asset and use or sell it; (c) its ability to use or sell the intangible asset; (d) how the intangible asset will generate probable future economic benefits; (e) the availability of adequate technical, financial and other resources to complete the development and to use or sell the intangible asset; and (f) its ability to measure reliably the expenditure attributable to the intangible asset during its development [International Accounting Standard (IAS) 38, 1998]. Since the capitalization criteria are essentially the same under both reporting regimes, a firm that

could have capitalized under UK GAAP but chose not to, would be mandated to capitalize under IFRS. Thus, by examining UK firms, we are able to investigate whether the market can identify firms with capitalize-eligible R&D expenditures, before they capitalized.[7]

Table 1 shows the formation of our sample. To construct our sample, we first obtain from Thomson Reuters Datastream those firms that disclosed either an R&D asset or R&D expense in any year t = 2002 - 2010. We begin in 2002 since 2005 was the first year of IFRS adoption in our sample, and we use three years of data under UK GAAP. We finish in 2010 since 2008 was the last year of IFRS adoption, and we require three years of data under IFRS. From this initial download of firm-year observations we examine the notes to the financial statements for all observations with a positive value of R&D asset to ensure that the data relates to R&D, and to record the amount of R&D capitalized and amortized in the period (firms with R&D expense but without an R&D asset are assumed to be expensers). For firms that have valid R&D datapoints, we also require them to have adopted IFRS. These analyses provide us with 4,598 firm-year observations (727 firms).

We then remove 1,156 firm-year observations (108) firms that have missing accounting and capital market data. At this stage we identified the IFRS adoption year for the remaining firms and then deleted ,918 firm-year observations (365 firms) outside of the six-year window.[8] We then remove 198 firm-year observations (33 firms) that had a mixed R&D policy in either (or both) of the regimes; that is, these firms had firm-year observations where they would capitalize

[7] In both SSAP 13 and IAS 38 research expenditures must be expensed; only development expenditures meeting the conditions detailed in this paragraph may be capitalized, resulting in a development asset. We use the term R&D to maintain consistency with the literature. Furthermore, both R and D expenditures are aggregated into one line item, so we cannot separately analyze them anyway.

[8] For example, for a firm that adopted IFRS in 2005, we deleted the 208-2010 firm-year observations. Similarly, for a firm that adopted IFRS in 2008, we deleted the 2002-2004 firm-year observations.

in some years, and expense in other years within the same regime. Next, we remove 1 firm (6 firm-year observations) that changed from capitalizing to expensing under IFRS and 2 firms (12 firm-year observations) that adopted IFRS earlier than 2005.

The next step in our sample construction is to identify our two primary sub-groups of firms: (1) those firms that always expensed under UK GAAP and then began to always capitalize under IFRS (voluntary expensers), and (2) those firms that always expensed under UK GAAP and continued to always expense under IFRS (mandatory expensers). In total, there are 86 voluntary expensers (516firm-year observations). There are 104 madnatory expenser firms (624 firm-year observations).

In addition to these two sub-groups, we also have a sub-group of firms that always capitalized under UK GAAP and IFRS ('capitalizers'). In total there are 26 capitalizer firms (156 firm-year observations). We include these firms in some of our tests, but they are not the focus of our analysis.

An important assumption underlying our tests is that capitalization of eligible development expenditures became mandatory under IFRS. There is much evidence to support this assumption. First, the fact that so many voluntary expensers switched is *prima facie* evidence that enforcement was effective, and mandatory expensers did not simply choose to avoid capitalization. Second, the timing of their switches was when IFRS went into effect, consistent with the mandate. Third, in the first IRFS year, voluntary expensers were required to disclose pro-forma (as-if IFRS) capitalized amounts pertaining to the *previous* (last UK GAAP) year. This shows that they could have capitalized under UK GAAP (i.e., they had development expenditures that met the capitalization conditions), but that they chose to expense, and only capitalized when they were mandated to. Fourth, Oswald et al (2022) analyzed the R&D

footnotes for every firm that expensed under both UK GAAP and IFRS. They found that industry membership was an important determinant of whether a firm remained an expenser. For example, firms in particular industries, such as Healthcare, explicitly mentioned that their development expenditures did not meet the capitalization conditions, due to the uncertainty of future benefits. Thus, firms that continued to expense either had only research expenditures, or their development expenditures never met the conditions for capitalization. Fifth, the U.K. bundled the IFRS adoption with the substantive enforcement changes to ensure compliance with IFRS, so it is reasonable to assume that capitalization of eligible development expenditures became mandatory (Christensen, Hail, and Leuz, 2013). In summary, there is strong evidence that the switch was mandatory, and enforcement was effective.

Table 2, Panel A presents descriptive statistics for mandatory and voluntary expensers during the UK GAAP and IFRS periods. For most fundamentals, we cannot reject equality between the two groups during the UK GAAP period (Column 3, Diff. p-value). This suggests that investors might not have been able to distinguish firms in the two groups, which we formally test, below.

Table 2, Panel B reports the industry membership of voluntary and mandatory expensers. The number of firms in each specific industry is small, so again, investors might have had a difficult time separating firms that had capitalizable expenditures from those that did not. Only in a few industries, such as Personal Products, Pharmaceuticals, and Specialty Chemicals, is there a heavy concentration of one type or the other.

4. Hypotheses and Tests

Our research is motivated by the difference between R&D expenditures that are eligible for capitalization vs those that are not, and whether the market could detect the difference when all R&D expenditures are expensed. As discussed above, capitalized expenditures have crossed the threshold to meet the IFRS definition of an asset. They are both closer to fruition and less risky (to produce future benefits) than expensed expenditures. Thus, the present value of the expected benefits of capitalized expenditures should be greater than the present value of expensed expenditures, and our first hypothesis is (in null form):

H1: The value relevance of capitalized and expensed expenditures are equal. Our alternative hypothesis is that capitalized expenditures have greater value relevance. We test H1 via equation (1):

$$R_{it} = a + b_1*NIRD_{it} + b_2*CHG\_NIRD_{it} + b_3*EXP_{it} + b_4*CAP_{it} + e_{it} \quad (1)$$

R_{it} is the cumulative stock return over the period from 9 months before fiscal year end to 3 months after fiscal year end; $NIRD_{it}$ is the firm's earnings before R&D expense; CHG_NIRD_{it} is the changes in firm's earnings before R&D expense; EXP_{it} and CAP_{it} are the expensed and capitalized components of R&D expenditures, respectively. NIRD and CHG_NIRD are included as control for performance. All variables are for firm i in year t. All four explanatory variables are on a per share basis and are deflated by P_{it-1}, the firm's share price at the beginning of the year. We estimate (1) on our sample of voluntary expensers under IFRS, when they are mandated to capitalize eligible development expenditures. Under the null (alternative) hypothesis, $b_3 = b_4$ ($b_3 < b_4$).

If capitalized R&D is more value relevant than expensed R&D, then the R&D of firms whose R&D expenditures have met the capitalization conditions should be more value relevant

than the R&D of firms whose R&D expenditures have not met the capitalization conditions (i.e., who must expense all of their R&D). The former were voluntary expensers under UK GAAP and then were mandated to switch to capitalization under IFRS. The latter were mandatory expensers under UK GAAP and continued to expense under IFRS. Our primary research question is whether the stock market could distinguish between these firms when both fully expensed under UK GAAP; i.e., whether the value relevance of both groups' R&D is equal. Thus, our second hypothesis is (in null form):

H2: The value relevance of voluntary expensers' and mandatory expensers' R&D expenditures are equal. We test H2 via equation (2):

$$R_{it} = a + b_1*NIRD_{it} + b_2*CHG\_NIRD_{it} + b_3*R\&D_{it} + e_{it} \qquad (2)$$

$R\&D_{it}$ is the firm's total R&D expenditure (both expensed and capitalized components, if the firm capitalized under IFRS), and all other variables are as above. We estimate (2) on both voluntary and mandatory expensers, in the last three years under UK GAAP and the first three years under IFRS. Under the null hypothesis, b_3 for voluntary expensers equals b_3 for mandatory expensers. Under the alternative hypothesis, b_3 for voluntary expensers is greater than b_3 for mandatory expensers. Since voluntary expensers became capitalizers under IFRS, their "type" was observable, and we expect to reject the null under IFRS. If the market could distinguish the two groups under UK GAAP, we'll reject the null hypothesis under this regime also. But, if the market could not distinguish the two groups under UK GAAP, we won't reject the null hypothesis. In this case, mandated capitalization brought new information to the market that was unknown beforehand. Hypothesis 2 is a classic example of a pooling vs separating equilibrium (Spence, 1978).

If we reject (don't reject) the null hypothesis H2 under IFRS (UK GAAP), then the new information provided by mandatory capitalization may have enabled the stock returns of voluntary expensers to reflect more future earnings information than the returns of mandatory expensers. Thus, our third hypothesis is (in null form):

H3: The amount of future earnings information reflected in stock returns did not decrease for mandatory expensers relative to voluntary expensers in the switch from UK GAAP to IFRS. We test H3 via the diff-in-diff equation (3):

$$\begin{aligned} R_{it} = {} & a + b_1*IFRS + b_2*MAN + b_3*IFRS*MAN + \\ & b_4*X_t + b_5*IFRS*X_t + b_6*MAN*X_t + b_7*IFRS*MAN*X_t + \\ & b_8*X_{t+T} + b_9*IFRS*X_{t+T} + b_{10}*MAN*X_{t+T} + b_{11}*IFRS*MAN*X_{t+T} + \\ & b_{12}*X_{t-1} + b_{13}*IFRS*X_{t-1} + b_{14}*MAN*X_{t-1} + b_{15}*IFRS*MAN*X_{t-1} + \\ & b_{16}*R_{t+T} + b_{17}*IFRS*R_{t+T} + b_{18}*MAN*R_{t+T} + b_{19}*IFRS*MAN*R_{t+T} + e_{it} \end{aligned} \quad (3)$$

X_t, X_{t-1},X_{t+T} are current, lagged and future earnings, respectively, and R_t and R_{t+T} are current and future stock returns; we use both two-years and three-years of future data. b_4 and b_4+b_5 are the contemporaneous Earnings Response Coefficients (ERCs) for voluntary expensers under UK GAAP and IFRS, respectively; b_4+b_6 and $b_4+b_6+b_7$ are the ERCs for mandatory expensers under UK GAAP and IFRS, respectively; b_8 and b_8+b_9 are the FERCs for voluntary expensers under UK GAAP and IFRS, respectively; b_8+b_{10} and $b_8+b_{10}+b_{11}$ are the FERCs for mandatory expensers under UK GAAP and IFRS, respectively. To provide an "apples to apples" comparison across firms and over time, earnings of capitalizers (voluntary expensers) under IFRS are adjusted to an as-if expense basis (Oswald and Zarowin, 2007). Our primary coefficient of interest is b_{11}, the incremental FERC for mandatory expensers under IFRS. Under the null (alternative) hypothesis, b_{11} is zero (negative).

5. Results

5.1 Primary results

Table 3, column 1, shows the results of equation (1) for voluntary expensers in the first three years of IFRS (i.e., when they have become capitalizers). The response coefficient on capitalized expenditures is a highly significant 6.353, while the coefficient on expensed expenditures is an insignificant 0.927, and the difference between the two coefficients is statistically significant (p-value = 0.05). The separation between the two types of expenditures, and the higher valuation of capitalized expenditures, is consistent with the analysis of Barker et al (2022), who emphasize the importance of uncertainty in accounting for intangibles. By definition, expensed investments are more uncertain than capitalized investments, because the latter have passed a feasibility threshold and are closer to fruition.

For comparison purposes, we also show the results of equation (1) for capitalizers (firms that capitalized eligible development expenditures under both UK GAAP and IFRS) under both IFRS and under UK GAAP (columns 2 and 3). The results for capitalizers are consistent with the results for voluntary expensers. Together, these results provide robust evidence that capitalized R&D costs are more valuable than expensed costs, consistent with (alternative) Hypothesis 1.[9]

As a first piece of evidence about whether the U.K. stock market could distinguish capitalization-eligible vs non-eligible R&D expenditures before IFRS, Table 3, column 4, shows the results of equation (1) for voluntary expensers using their pro-forma data and contemporaneous returns. As pointed out above, in the first IRFS year, voluntary expensers were required to disclose pro-forma (as-if IFRS) capitalized amounts pertaining to the *previous* (last UK GAAP) year. Although these data were not disclosed until the next (first IFRS) year, if the

[9] Since both the two groups (voluntary expensers and capitalizers) and the two time periods (UK GAAP vs IFRS) are different, there is no requirement that the coefficients be equal across the 3 columns in Table 3.

market understood that voluntary expensers had capitalizable R&D expenditures, it should have valued these capitalizable expenditures more highly than expensed expenditures (as columns 1 – 3 show), before IFRS. However, column 4 shows that the market could not do this. While these pro-forma results are admittedly based on a small sample size, they provide no evidence that the market could properly value firms' R&D expenditures before IFRS.

Table 4 shows the results of equation (2) separately for voluntary and mandatory expensers, under the last 3 years of UK GAAP and the first 3 years of IFRS. Under UK GAAP, the R&D response coefficients of the two groups are almost the same, 2.612 and 2.794 for mandatory and voluntary expensers, respectively, and they are statistically indistinguishable (t = -.221, column 3). Under IFRS, the R&D response coefficient for voluntary expensers is 1.981 (t = 3.39) while the R&D response coefficient for the mandatory expensers is -0.032 (t = .06), and the difference is statistically significant (t = -2.78). Table 4 shows that the market could not distinguish the relative valuation of the two groups' R&D expenditures until the groups revealed their types under IFRS.[10]

Although we cannot directly compare the R&D response coefficients across the different periods due to, for example, macroeconomic changes in discount rates and market growth forecasts, the results in Table 4 suggest that under UK GAAP, the capital market assumes that both voluntary expensers and mandatory expensers have developed R&D projects.

In particular, the coefficients of 2.61 and 2.79 for mandatory and voluntary expensers in columns 1 and 2, respectively, imply that one pound of R&D investment is expected to return between 2 ½ and 3 pounds, and the similarity of the coefficients suggests that under UK GAAP, the market assumed that both voluntary and mandatory expensers had capitalizable R&D costs.

[10] Our results are consistent with Amir, Lev, and Sougiannis (2003), who find that financial analysts cannot overcome deficient R&D reporting.

Only after IFRS adoption could the market tell that firms that continue to expense do not have "mature" R&D investments. Comparing the coefficient of .03 on expensed R&D for mandatory expensers (Table 4, column 4) with the coefficient of .927 on expensed R&D for voluntary expensers (albeit insignificant, Table 3, column 1) suggests that once firms separate expensed vs capitalized R&D, the market heavily discounts firms' R&D expenditures, until feasibility is demonstrated by capitalization.

In summary, there was a pooling equilibrium under UK GAAP, and the two groups were not separated until mandatory capitalization revealed information that the market did not know beforehand.

As another test of whether mandatory capitalization reveals new information, equation (3) tests how each group's Future Earnings Response Coefficient changed from UK GAAP to IFRS. If capitalization reveals new information (about future earnings), FERC of voluntary expensers' should increase relative to FERC of mandatory expensers, in the switch from UK GAAP to IFRS. Table 5 shows the results of equation (3). Consistent with (alternative) Hypothesis 3, coefficient b_{11} on IFRS*MAN*X_{t+T} is significantly negative for both the two-year and the three-year horizons (-.246 and -.188, respectively), so FERC declined for mandatory expensers relative to voluntary expensers in the switch from UK GAAP to IFRS. This indicates that capitalization enabled returns to incorporate more information about future earnings. Together, the results in Tables 3 – 5 indicate that the market could not separate voluntary vs mandatory expensers under UK GAAP, and IFRS' requirement for firms to capitalize eligible development expenditures revealed new information to the market.

5.2 Effects of Capitalization on Leverage

Up to this point, we have examined the pricing effects of the newly revealed capitalization information. Although not our primary focus, we now examine a real effect of the information on firms' leverage. Lim, Macias, and Moeller (2020) show that identifiable intangible assets can increase debt capacity, because their value, separability, and importance in generating cash flows makes them potentially collateralizable. We have shown that capitalized R&D expenditures are more valuable than expensed expenditures, and by virtue of being recognized as an asset, future cash flows from capitalized R&D are more certain than cash flows from expensed R&D. Thus, analogous to Lim et al (2020), voluntary expensers may have been able to increase their leverage relative to mandatory expensers, once the market learned that voluntary expensers had capitalizable R&D. Consistent with this expectation, Table 2 shows that voluntary expensers' leverage increased by .016 (.039 to .055) from UK GAAP to IFRS, while mandatory expensers' only increased by .01 (.059 to .060). Thus, our fourth hypothesis is (in null form):

H4: Leverage of voluntary expensers did not increase relative to leverage of mandatory expensers in the switch to IFRS. Our alternative hypothesis is that voluntary expensers' leverage increased relative to mandatory expensers. We test H4 via the diff-in-diff equation (4):

$$LEV = a + b_1*IFRS + b_2*VOL*IFRS + controls + e_{it} \qquad (4)$$

LEV is total debt/total assets. To make an "apples-to-apples" comparison, voluntary expensers total assets under IFRS have been restated to be on an as-if expense basis (by subtracting capitalized R&D). Following prior studies (Lemmon, Roberts, and Zender, 2008; Lim et al. 2020), we use ROA, BTM, VROA, Size, Cash Liquidity, and Asset Tangibility as control variables. Results of (4), shown in Table 6, support (alternative) Hypothesis 4, that voluntary

expensers' leverage increased relative to mandatory expensers'. The coefficient on VOL*IFRS is statistically significant with a one-sided p-value of 0.04, and the coefficient magnitude of .020 shows that effect is economically significant, given the mean leverage of about .06 (Table 2). This shows that the new information revealed by capitalization not only affects the market's pricing of R&D expenditures and the amount of future earnings information impounded into returns, but also affects firms' ability to issue debt.[11]

5.3 Alternative Explanation – Real Change in the Composition of R&D Expenditures

We have assumed that the increase in the valuation of voluntary expensers' R&D expenditures was due to the change in financial reporting, which revealed new information that the market did not previously know. However, an alternative interpretation of our results is that the valuation change is due to real effects, rather than to market learning. That is, we showed above that capitalized costs are more valuable than expensed costs. If the market could separate voluntary expensers from mandatory expensers under UK GAAP, but voluntary expensers changed their mix of R&D expenditures to more capitalizable costs, the valuation of their total expenditures would rise. In this case, it would be the real change in the composition of R&D expenditures, and not the market's learning due to the financial reporting change, that caused the valuation change.

There are two strong pieces of evidence against this "real change" explanation. First, as long as voluntary expenses had *some* capitalizable expenditures under UK GAAP, there should be *some separation* even if their CAP% (percentage of R&D expenditures that are capitalized) increased under IFRS; but as shown by the similarity of the two groups' R&D response

[11] There are many layers to debt analysis, such as duration, yield, covenants, etc. Since our analysis of the relation between capitalization and debt is exploratory and not the primary focus of our paper, we leave these important issues to future research.

coefficients in Table 4 (2.61 and 2.79 for mandatory and voluntary expensers in columns 1 and 2, respectively), there was no separation. Second, if the separation under IFRS was due to a real change in the composition of firms' R&D expenditures, it would imply a big change in voluntary expensers' business models (from basic research to development), in just one year, which seems unlikely.

Nevertheless, to verify that market learning due to the change in financial reporting, and not a change in the composition of R&D expenditures, is the reason behind the valuation change, we conduct three tests. First, as mentioned above, in the first year of IFRS, voluntary expensers were required to disclose their pro-forma capitalization information for the last UK GAAP year (i.e., retrospectively). In order to explain the change in relative R&D response coefficients (voluntary expensers compared to mandatory expensers) from UK GAAP to IFRS, voluntary expensers' CAP% must have increased by .17.[12] For the full sample of voluntary expensers, the mean pro-forma CAP% = .23, and the mean CAP% in the first 3 IFRS years is .36 (untabulated), an increase of .13 which is not big enough.

Second, we conduct an analysis, shown in Table 4, removing voluntary expensers who have higher earnings management incentives after IFRS adoption. Oswald et al. (2023) show that voluntary expensers increase the percentage of R&D expenditures that is capitalized, to avoid recording losses after IFRS adoption. If the increase in the capitalized amount of R&D due to earnings management generates our results, we do not expect to find the same results with voluntary expensers that have little incentive to manage earnings using R&D expenditures. Following Bushee (1998) and Oswald et al. (2023), we classify each firm-year observation into

[12].17 is calculated as follows: the difference in R&D response coefficients between voluntary vs mandatory expensers changes from 0.2 (2.8 – 2.6) to 2.0 (2.0 - 0), an increase of 1.8 (Table 4); 1.8 = X*6.3 + (1-X)*.9 [weight * coefficient on capitalized part, + (1-weight) * coefficient on expensed part, Table 3], so X = .17.

three groups, based on their incentives to manage earnings with R&D.[13] We construct an indicator variable, *Low_EM*, that has a value of 1 if a voluntary expenser has zero firm-year observations under IFRS falling into the group that represents the highest earnings management incentives, and 0 otherwise. Table 7 shows the estimation results. Columns 1 and 4 show the results for mandatory expensers under UK GAAP and IFRS as in Table 4. Columns 2 and 5 show the results for voluntary expensers with little earnings management incentives under UK GAAP and IFRS. We find that there is a separation under IFRS between mandatory expensers and voluntary expensers who do not have great incentives to manage earnings by increasing the percentage of R&D expenditures that is capitalized. This supports our claim that our results cannot be attributed to the real effects.

Third, 73% of voluntary expensers (63 firms) disclose non-zero pro-forma R&D capitalization, while 27% disclose zero.[14] Since the remaining 27% may have had a bigger increase in the fraction of capitalizable expenditures, we repeat Tables 3 - 5 on the 63 non-zero pro-forma firms. For these 63 firms, the average pro-forma percentage of capitalized expenditures is .313, and the average percentage in the first 3 IFRS years is .396, and increase of only .084 (untabulated). Results are shown in Tables 3A, 4A, and 5A.

Table 3A, like Table 3, shows that capitalized expenditures have a higher response coefficient than expensed expenditures. Table 4A, like Table 4, shows that under UK GAAP there

[13] Given that firms manage earnings to avoid losses, we create the following groupings based on the current year earnings before R&D (NIRD) compared to the previous year's R&D.

Group 1	Group 2	Group 3
$NIRD_t < 0$	$0 < NIRD_t < RD_{t-1}$	$RD_{t-1} < NIRD_t$

Group 1 firms are performing so poorly that they show losses even before considering current R&D expenditures. By contrast, Group 3 firms are successful enough that they would show current year pre-tax profits even if current year R&D expenditures maintained at last year's level. Group 2 would show losses if they maintained R&D expenditures at last year's level, but can show profits by cutting R&D expenditures.

[14] It is unlikely that the 27% really had zero pro-forma capitalization, as this would imply a big change in their business models in just one year. More likely, they just did not disclose any. Nevertheless, we take their data at face value.

was a small and insignificant difference in the R&D response coefficients between voluntary and mandatory expensers (2.489 vs 2.612); but, under IFRS there was a large and statistically significant difference (2.439 vs .032, t = -2.2). Finally, Table 5A, like Table 5, shows that the FERC for mandatory expensers decreased relative to the FERC for voluntary expensers in the switch from UK GAAP to IFRS. Thus, it is highly unlikely that a shift in the composition of R&D expenditures is responsible for the increase in voluntary expensers' R&D response coefficient that is shown in Table 4, their increase in FERC in Table 5, and their increase in leverage shown in Table 6.

In summary, the collective results of our tests are consistent and indicate that the change in financial reporting under IFRS is the likely cause of the increase in voluntary expensers' R&D response coefficients, and of the separating equilibrium that the increase represents.

6. Conclusion

We examine whether the stock market can distinguish firms with more valuable (capitalization-eligible) vs less valuable (not capitalization-eligible) R&D expenditures, when all firms expense R&D. Our investigation is particularly applicable to markets like the U.S, where expensing R&D is mandated, and no additional disclosures are required.

Our setting is the UK around the time of its switch from UK GAAP to IFRS in 2006. Under both regimes, research expenditures and development expenditures that did not meet capitalization conditions must be expensed. Under UK GAAP, firms had the option to expense or capitalize capitalization-eligible R&D expenditures. Thus, there were mandatory expensers (who did not have capitalization-eligible R&D expenditures), and voluntary expensers (who had

capitalization-eligible R&D expenditures, but chose to expense them). Under IFRS, such eligible expenditures must be capitalized, so voluntary expensers were required to reveal their type.

We find that under UK GAAP, the UK stock market valued the R&D expenditures of both mandatory and voluntary expensers equally; i.e., the market could not separate the two groups of firms, and there was a pooling equilibrium. R&D of voluntary expensers was valued more highly only under IFRS. Consistent with the revelation of the value relevant information in the switch from UK GAAP to IFRS, the FERC of voluntary expensers increased relative to the FERC of mandatory expensers, and voluntary expensers increased their leverage relative to mandatory expensers.

In the U.S., where almost all R&D costs are expensed, there is much debate about whether (at least some) R&D costs should be capitalized. Although they do not explicitly advocate for an IFRS-like separation, our results are consistent with Barker et al (2022), who emphasize the importance of investment uncertainty, since expensed R&D investments are more uncertain than capitalized R&D investments. In terms of its lessons for U.S. regulators, our results can serve as an example of evidence-based policy making (Leuz, 2018). In this regard, some may question whether results from the UK can be extrapolated to the U.S.? As Leuz points out, we would not apply results from a study of plant emissions in India, where auditors are paid less than $1,000 per audit, to the U.S. Clearly, learning from the U.K. what U.S. results might look like, does not suffer from this problem of large cross-country differences, as it is widely agreed that the U.K.'s capital market is the most comparable to the U.S'. Indeed, the dearth of capitalization information among U.S. R&D firms is like U.K. expensers before IFRS, attesting to the similarity of the two settings. Thus, our results can offer valuable lessons for U.S. regulators.

More generally, our evidence points to the importance of disclosure regulation (Leuz and Wysocki, 2016). We offer strong and consistent evidence that voluntary disclosure was not enough. Without mandatory capitalization revealing firms' types, the market was not able to properly value firms' R&D expenditures, voluntary expensers' stock returns incorporated less future earnings information, and their leverage was lower, than with the new information.

An important question for future research is why voluntary expensers didn't reveal their valuable R&D investments to the market before IFRS. Two possible reasons are proprietary costs, and/or not wanting to incur the costs to track and identify projects that passed the capitalization threshold (Nixon, 1997). But, regardless of the reason, it doesn't affect our main conclusion: the stock market cannot capitalize R&D expenditures when firms aren't mandated to.

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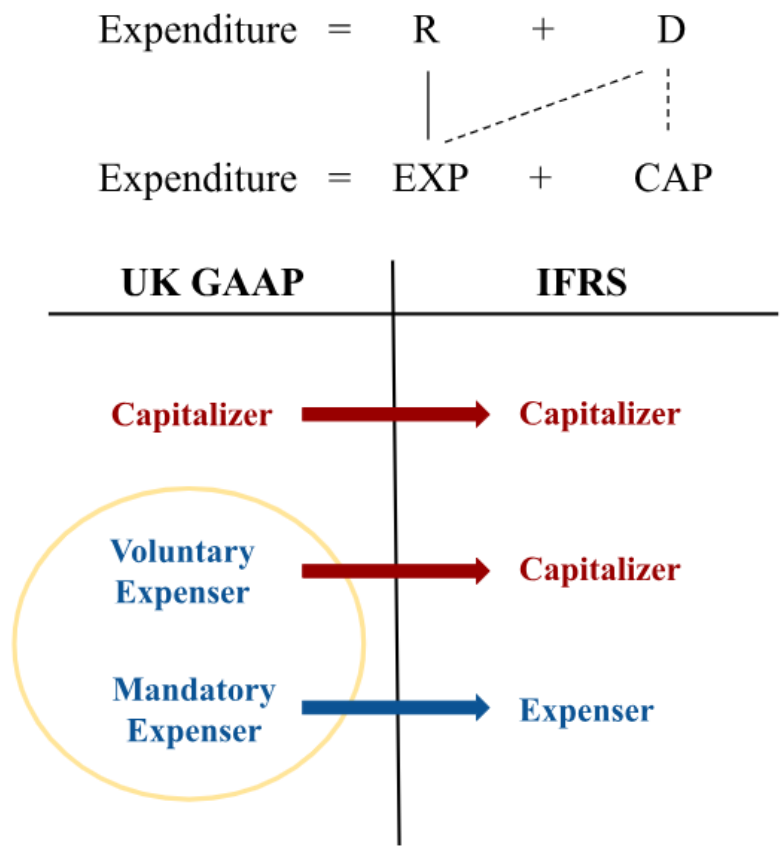
Appendix. Variable descriptions

Variable	Definition
R&D	The amount of total R&D expenditure in year t scaled by market cap in year t-1
EXP	The amount of R&D expenditure expensed in year t scaled by market cap in year t-1
CAP	The amount of R&D expenditure capitalized in year t scaled by market cap in year t-1
MAN	1 if firm is a mandatory expenser under UK GAAP and 0 otherwise
VOL	1 if firm is a voluntary expenser under UK GAAP and 0 otherwise
RET	Cumulative stock return over the period from 9 months before fiscal year end to 3 months after fiscal year end
IFRS	1 if firm follows IFRS standard in year *t*, and 0 otherwise.
NIRD	Net income before after-tax R&D expense (net income plus R&D expense * (1 – 0.3))
CHG_NIRD	Annual change of NIRD
NI_AS_IF	As-if net income in year t scaled by market cap in year t-1
LAG_NI_AS_IF	As-if net income in year t-1 scaled by market cap in year t-2
FUTURE_NI_AS_IF	Sum of as-if net income scaled by lagged market cap over the two or three years.
FUTURE_RET	Cumulative stock return over the period from 3 months to 27 or 39 months after fiscal year end
SIZE	Log (market value of equity), measured 3 months after fiscal year end
BTM	As-if Book value of equity / Market value of equity
LEVERAGE	Total debt/total assets
LEVERAGE_AS_IF	Total debt/As-if total assets. As-if total asset is total asset minus R&D asset at the end of fiscal year
ROE	Net income / Common Equity
ROA	Net income / Total asset
VROA	Variance of ROA over prior four years
CASH_LIQUIDITY	Cash / Total asset
ASSET_TANGIBILITY	PP&E(net)/Total asset

<u>Figure 1:</u> Accounting for R&D Expenditures Under UK GAAP and IFRS



Capitalizer = Voluntarily chose to capitalize eligible development expenditures under UK GAAP; continued to do so under IFRS

Voluntary Expenser = Voluntarily chose to expense eligible development expenditures under UK GAAP; mandated to capitalize them under IFRS

Mandatory Expenser = Do not have eligible development expenditures

Table 1
Sample Selection

	Firm-Year Obs	Firms
IFRS Adopted Firms (2002~2010)	4,598	727
Remove:		
Missing Control Variables	(1,156)	(108)
Outside Six-Year Window	(1,918)	(365)
Mixed R&D Policy	(198)	(33)
Reverse Switcher or Early Switcher	(18)	(3)
Final Sample	1,296	216
• Type		
Voluntary Expenser	516	86
Mandatory Expenser	624	104
Capitalizer	156	26

The sample consists of up to six firm-year observations per firm of U.K. firms that disclosed either an R&D asset or R&D expense during the period 2002_2010. To obtain our final sample, we remove inappropriate observations and require accounting and financial data. Voluntary Expensers are firms that switched from expensing R&D under U.K. GAAP to capitalizing R&D under IFRS. Mandatory Expensers are firms that always expensed R&D under U.K. GAAP and IFRS. Capitalizers are firms that always capitalized R&D under U.K. GAAP and IFRS.

Table 2
Sample Description

Panel A: Descriptive Statistics: Voluntary Expensers vs. Mandatory Expensers

	Under U.K. GAAP			Under IFRS		
	Voluntary Expensers	Mandatory Expensers	Diff.	Voluntary Expensers	Mandatory Expensers	Diff.
	Mean	Mean	*P*-value	Mean	Mean	*P*-value
R&D	0.084	0.075	0.366	**0.087**	**0.064**	**0.025**
RET	0.206	0.157	0.268	0.087	0.09	0.942
NIRD	0.037	-0.007	**0.020**	0.089	0.044	**0.002**
CHG_NIRD	0.032	0.014	0.416	0.01	0.003	0.675
SIZE	11.369	11.66	0.131	11.585	11.828	0.255
BTM	0.418	0.538	**0.031**	0.518	0.499	0.734
LEVERAGE	0.039	0.059	**0.007**	0.051	0.060	0.277
LEVERAGE_AS_IF	0.039	0.059	**0.007**	0.055	0.060	0.542
ROE	-0.081	-0.061	0.775	0.091	-0.006	**0.071**
ROA	-0.039	-0.105	**0.008**	0.054	-0.075	**<0.001**
VROA	0.08	0.191	**0.034**	0.029	0.099	**0.021**
CASH_LIQUIDITY	0.163	0.171	0.576	0.139	0.171	**0.022**
ASSET_TANGIBILITY	0.196	0.238	**0.009**	0.165	0.198	**0.024**

Table 2

Sample Description – Continued

Panel B: Industry Membership

Industry	Voluntary Expensers	Mandatory Expensers	**Industry**	Voluntary Expensers	Mandatory Expensers
Aerospace	1	1	Home Construction	1	0
Alternative Fuels	2	0	Industrial Machinery	6	9
Auto Parts	3	0	Industrial Suppliers	1	1
Biotechnology	7	2	Integrated Oil & Gas	1	0
Brewers	1	0	Internet	2	0
Building Mat.& Fix.	2	2	Media Agencies	0	1
Bus.Train & Employmnt	1	0	Medical Equipment	2	4
Business Support Svs.	3	5	Medical Supplies	1	3
Clothing & Accessory	1	0	Mobile Telecom.	2	0
Computer Hardware	1	1	Multiutilities	2	0
Comm. Vehicles,Trucks	0	1	Nondur.Household Prod	1	0
Computer Services	3	6	Oil Equip. & Services	1	0
Con. Electricity	0	1	Paper	1	0
Containers & Package	2	2	Personal Products	4	0
Defense	0	2	Pharmaceuticals	7	1
Distillers & Vintners	1	0	Restaurants & Bars	0	1
Divers. Industrials	0	1	Semiconductors	1	4
Dur. Household Prod.	1	0	Software	11	18
Electrical Equipment	8	5	Specialty Chemicals	6	1
Electronic Equipment	2	5	Telecom. Equipment	2	4
Fixed Line Telecom.	1	0	Toys	1	2
Food Products	3	2	Transport Services	1	0
Food Retail, Wholesale	1	0	Water, Disposal Svs.	1	0
Heavy Construction	1	0	Water	2	1
			Total	104	86

Table 2 presents the sample description for our final sample. Panel A shows the descriptive statistics of Voluntary Expensers and Mandatory Expensers in each accounting regime. Columns (3), (6), and (9) of Panel A report the p-value of t-tests comparing the sample means of these two groups. Panel B shows the Datastream level-6 industry distribution of Voluntary Expensers and Mandatory Expensers.. See the Appendix for variable definitions.

Table 3. Value Relevance of Capitalized and Expensed R&D Expenditure

Results of equation (1): $R_{it} = a + b_1*NIRD_{it} + b_2*CHG\_NIRD_{it} + b_3*EXP_{it} + b_4*CAP_{it} + e_{it}$

VARIABLES	(1) Voluntary Expenser IFRS Decomposition	(2) Capitalizer IFRS Decomposition	(3) Capitalizer UK GAAP Decomposition	(4) Voluntary Expenser Last UK GAAP Pro-Forma
NIRD	0.728	0.724	-0.615	**1.652*****
	(1.420)	(1.398)	(-0.973)	**(5.247)**
CHG_NIRD	0.046	-0.096	**0.606***	**1.120*****
	(0.121)	(-0.223)	**(1.768)**	**(3.847)**
EXP	0.927	**-1.856*****	-0.099	0.567
	(0.792)	**(-3.507)**	(-0.079)	(1.236)
CAP	**6.353*****	**5.670****	**12.975*****	-1.444
	(2.939)	**(2.136)**	**(3.522)**	(-1.062)
Constant	-0.208**	-0.025	-0.121	0.062
	(-2.171)	(-0.359)	(-1.455)	(1.253)
	EXP = CAP: p-value 0.05	*EXP = CAP*: p-value 0.02	*EXP = CAP*: p-value <0.01	
Observations	258	78	78	75
Adjusted R-squared	0.279	0.427	0.453	0.330
Fixed Effects	Firm & Year	Firm & Year	Firm & Year	Industry
Clustered SE	Firm	Firm	Firm	No

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in the Appendix.

Table 4. Value Relevance of R&D Expenditure for Voluntary and Mandatory Expensers

Results of equation (2): $R_{it} = a + b_1*NIRD_{it} + b_2*CHG\_NIRD_{it} + b_3*R\&D_{it} + e_{it}$

	UK GAAP			IFRS		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Mandatory Expenser	Voluntary Expenser	DIFF	Mandatory Expenser	Voluntary Expenser	DIFF
NIRD	-0.319	-0.060	-0.127	-0.273	0.684	0.530
	(-0.774)	(-0.143)	(-0.331)	(-0.587)	(1.465)	(1.085)
NIRD*MAN			-0.151			-0.760
			(-0.273)			(-1.149)
CHG_NIRD	**0.445*****	0.199	0.268	**0.510****	0.127	0.241
	(2.652)	(0.784)	(1.117)	**(1.993)**	(0.400)	(0.747)
CHG_NIRD*MAN			0.183			0.239
			(0.640)			(0.578)
R&D	**2.612*****	**2.794*****	**2.697*****	0.032	**1.981*****	**1.777*****
	(4.487)	**(3.962)**	**(4.131)**	(0.057)	**(3.388)**	**(3.389)**
R&D*MAN			-0.191			**-1.759*****
			(-0.221)			**(-2.778)**
Constant	-0.047	-0.032	-0.032	0.098**	-0.148*	0.000
	(-1.118)	(-0.525)	(-0.917)	(2.134)	(-1.945)	(0.004)
Observations	312	258	570	312	258	570
Adjusted R-squared	0.370	0.231	0.305	0.146	0.262	0.199
Fixed Effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in the appendix.

Table 5. Future Earnings Response Coefficient

Results of equation (3)

$$R_{it} = a + b_1*IFRS + b_2*MAN + b_3*IFRS*MAN + b_4*X_t + b_5*IFRS*X_t + b_6*MAN*X_t + b_7*IFRS*MAN*X_t + b_8*X_{t+T} + b_9*IFRS*X_{t+T} + b_{10}*MAN*X_{t+T} + b_{11}*IFRS*MAN*X_{t+T} + b_{12}*X_{t-1} + b_{13}*IFRS*X_{t-1} + b_{14}*MAN*X_{t-1} + b_{15}*IFRS*MAN*X_{t-1} + b_{16}*R_{t+T} + b_{17}*IFRS*R_{t+T} + b_{18}*MAN*R_{t+T} + b_{19}*IFRS*MAN*R_{t+T} + e_{it}$$

VARIABLES	(1) TWO-YEAR FUTURE EPS	(2) THREE-YEAR FUTURE EPS
NI_AS_IF	**0.426***	**0.428***
	(1.750)	**(1.772)**
NI_AS_IF*IFRS	0.048	0.117
	(0.110)	(0.268)
NI_AS_IF*MAN	-0.106	-0.114
	(-0.357)	(-0.384)
NI_AS_IF*MAN*IFRS	0.093	0.070
	(1.100)	(0.827)
FUTURE_NI_AS_IF	0.039	-0.008
	(0.665)	(-0.141)
FUTURE_NI_AS_IF*IFRS	**0.247*****	**0.196****
	(3.196)	**(2.048)**
FUTURE_NI_AS_IF*MAN	-0.029	0.015
	(-0.430)	(0.245)
FUTURE_NI_AS_IF*MAN*IFRS	**-0.246*****	**-0.188***
	(-2.862)	**(-1.909)**
LAG_NI_AS_IF	-0.204	-0.210
	(-1.265)	(-1.311)
LAG_NI_AS_IF*IFRS	-0.406	-0.384
	(-1.169)	(-1.198)
LAG_NI_AS_IF*MAN	0.010	0.031
	(0.048)	(0.146)
LAG_NI_AS_IF*MAN*IFRS	0.451	0.399
	(0.989)	(0.935)
FUTURE_RET	-0.066	-0.037
	(-1.123)	(-0.937)
FUTURE_RET*IFRS	-0.060	-0.114
	(-0.658)	(-1.413)
FUTURE_RET*MAN	0.011	-0.034
	(0.129)	(-0.604)
FUTURE_RET*MAN*IFRS	-0.017	0.066
	(-0.142)	(0.728)
IFRS	-0.106	-0.100
	(-1.470)	(-1.361)
MAN	-0.040	-0.023
	(-0.735)	(-0.466)
MAN*IFRS	0.093	0.070
	(1.100)	(0.827)
Constant	**0.204*****	**0.215*****
	(5.148)	**(5.505)**

Observations	1,140	1,140
Adjusted R-squared	0.183	0.186
Fixed Effects	Industry & Year	Industry & Year
Clustered SE	Firm	Firm

t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in the Appendix.

Table 6. Leverage Ratio

Results of equation (4): $LEV = a + b_1*IFRS + b_2*VOL*IFRS + controls + e_{it}$

VARIABLES	(1) Leverage As If
IFRS	-0.003
	(-0.252)
VOL*IFRS	**0.020***
	(1.784)
ROA	-0.023
	(-1.263)
BTM	**-0.025****
	(-2.403)
VROA	-0.003
	(-0.178)
SIZE	**-0.018****
	(-2.085)
CASH_LIQUIDITY	-0.086
	(-1.651)
ASSET_TANGIBILITY	-0.040
	(-1.417)
Constant	0.293***
	(2.909)
Observations	1,137
Adjusted R-squared	0.521
Fixed Effects	Firm & Year
Clustered SE	Firm

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1
All variables are defined in the Appendix.

Table 7. Value Relevance of R&D Expenditures: Voluntary Expensers with Low Earnings Management Incentives

Results of equation (2): $R_{it} = a + b_1*NIRD_{it} + b_2*CHG\_NIRD_{it} + b_3*R\&D_{it} + e_{it}$

	UK GAAP			IFRS		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Mandatory Expenser	Voluntary Expneser (Low_EM=1)	DIFF	Mandatory Expenser	Voluntary Expneser (Low_EM=1)	DIFF
NIRD	-0.319	-0.012	-0.087	-0.273	0.673	0.524
	(-0.774)	(-0.028)	(-0.217)	(-0.587)	(1.420)	(1.061)
NIRD*MAN			-0.193			-0.756
			(-0.342)			(-1.137)
CHG_NIRD	**0.445*****	0.162	0.234	**0.510****	0.123	0.236
	(2.652)	(0.619)	(0.951)	**(1.993)**	(0.384)	(0.729)
CHG_NIRD*MAN			0.215			0.244
			(0.741)			(0.590)
R&D	**2.612*****	**2.739*****	**2.627*****	0.032	**1.945*****	**1.750*****
	(4.487)	**(3.635)**	**(3.797)**	(0.057)	**(3.257)**	**(3.268)**
R&D*MAN			-0.116			**-1.738*****
			(-0.129)			**(-2.724)**
Constant	-0.047	-0.025	-0.029	0.098**	-0.135*	0.008
	(-1.118)	(-0.392)	(-0.809)	(2.134)	(-1.723)	(0.170)
Observations	312	246	558	312	246	558
Adjusted R-squared	0.374	0.216	0.301	0.150	0.268	0.201
Fixed Effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1
This table replicates Table 4, for Voluntary Expensers with low earnings management incentives.

Table 3A. Value Relevance of Capitalized and Expensed R&D Expenditure Using Non-Zero Pro-Forma CAP% Voluntary Expenser

	(1)	(2)	(3)
VARIABLES	Non-Zero Voluntary Expenser IFRS Decomposition	Capitalizer IFRS Decomposition	Capitalizer UK GAAP Decomposition
NIRD	0.770*	0.724	-0.615
	(1.757)	(1.398)	(-0.973)
CHG_NIRD	0.385	-0.096	**0.606***
	(1.407)	(-0.223)	**(1.768)**
EXP	-0.069	**-1.856*** **	-0.099
	(-0.056)	**(-3.507)**	(-0.079)
CAP	**8.667*** **	**5.670** **	**12.975*** **
	(4.729)	**(2.136)**	**(3.522)**
Constant	-0.263***	-0.025	-0.121
	(-3.060)	(-0.359)	(-1.455)
Observations	189	78	78
Adjusted R-squared	0.423	0.427	0.453
Fixed Effects	Firm & Year	Firm & Year	Firm & Year
Clustered SE	Firm	Firm	Firm

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

This table replicates Table 3, for Voluntary Expensers with non-zero pro-forma CAP% (% of R&D expenditure that is capitalized).

Table 4A. Value Relevance of R&D Expenditure for Voluntary and Mandatory Expensers Using Non-Zero Pro-Forma CAP% Voluntary Expensers

	UK GAAP			IFRS		
	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Mandatory Expenser	Non-Zero Voluntary Expenser	DIFF	Mandatory Expenser	Non-Zero Voluntary Expenser	DIFF
NIRD	-0.319	-0.172	-0.146	-0.273	0.834*	0.704
	(-0.774)	(-0.472)	(-0.437)	(-0.587)	(1.978)	(1.547)
NIRD*MAN			-0.147			-0.932
			(-0.281)			(-1.460)
CHG_NIRD	**0.445*** **	0.300	0.323	**0.510** **	0.256	0.331
	(2.652)	(1.030)	(1.171)	**(1.993)**	(0.818)	(0.975)
CHG_NIRD*MAN			0.126			0.144
			(0.398)			(0.329)
R&D	**2.612*** **	**2.489*** **	**2.440*** **	0.032	**2.349*** **	**2.247** **
	(4.487)	**(3.924)**	**(3.968)**	(0.057)	**(2.701)**	**(2.505)**
R&D*MAN			0.046			**-2.178** **
			(0.055)			**(-2.213)**
Constant	-0.047	-0.028	-0.033	0.098**	-0.207**	-0.012
	(-1.118)	(-0.465)	(-0.956)	(2.134)	(-2.654)	(-0.260)
Observations	312	189	501	312	189	501
Adjusted R-squared	0.370	0.330	0.343	0.146	0.342	0.221
Fixed Effects	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5A. Future Earnings Response Coefficient Using Non-Zero Pro-Forma CAP% Voluntary Expenser

VARIABLES	(1) TWO-YEAR FUTURE EPS	(2) THREE-YEAR FUTURE EPS
NI_AS_IF	**0.503***	0.478
	(1.667)	(1.550)
NI_AS_IF*IFRS	0.767	**0.813***
	(1.598)	**(1.680)**
NI_AS_IF*MAN	-0.202	-0.178
	(-0.576)	(-0.500)
NI_AS_IF*MAN*IFRS	-0.714	-0.736
	(-1.200)	(-1.212)
FUTURE_NI_AS_IF	-0.003	**-0.057****
	(-0.105)	**(-2.228)**
FUTURE_NI_AS_IF*IFRS	**0.333****	**0.256****
	(2.181)	**(2.015)**
FUTURE_NI_AS_IF*MAN	0.008	**0.062***
	(0.192)	**(1.858)**
FUTURE_NI_AS_IF*MAN*IFRS	**-0.328****	**-0.246***
	(-2.110)	**(-1.914)**
LAG_NI_AS_IF	-0.198	-0.230
	(-0.916)	(-1.057)
LAG_NI_AS_IF*IFRS	-0.424	-0.404
	(-1.155)	(-1.075)
LAG_NI_AS_IF*MAN	0.008	0.054
	(0.030)	(0.209)
LAG_NI_AS_IF*MAN*IFRS	0.439	0.391
	(0.934)	(0.837)
FUTURE_RET	-0.134**	-0.069
	(-2.103)	(-1.450)
FUTURE_RET*IFRS	0.015	-0.039
	(0.191)	(-0.463)
FUTURE_RET*MAN	0.077	-0.004
	(0.844)	(-0.060)
FUTURE_RET*MAN*IFRS	-0.089	-0.003
	(-0.779)	(-0.031)
IFRS	**-0.190*****	**-0.188*****
	(-2.923)	**(-2.786)**
MAN	-0.067	-0.045
	(-1.135)	(-0.806)
MAN*IFRS	**0.186****	**0.161****
	(2.413)	**(2.057)**
Constant	**0.204*****	**0.215*****
	(5.148)	**(5.505)**
Observations	1,002	1,002
Adjusted R-squared	0.203	0.205
Fixed Effects	Industry & Year	Industry & Year
Clustered SE	Firm	Firm

t-statistics in parentheses

*** p<0.01, ** p<0.05, * p<0.1