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Article

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The effect of IFRS 15 mandatory adoption on earnings management: Evidence from firms listed on the STOXX Europe 600 Index

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Abstract

Research Question: Does the mandatory adoption of International Financial Reporting Standard (IFRS) 15 "*Revenue from contracts with customers*" affect earnings quality?

Motivation: This study adds to the empirical literature on the effects of IFRS implementation on earnings quality by examining a specific standard that addresses one of the key performance indicators i.e., Revenue.

Idea: This study investigates whether the adoption of IFRS 15 is associated with changes in both accrual-based and real earnings management activities.

Data: The sample consists of firms listed on the STOXX Europe 600 index. We identified 3,327 firm-year observations over the 2012- 2023 period. The study employs a difference-in-differences design.

Tools: We employed a multiple regression model with panel data, including industry and year fixed effects. Estimations were carried out using STATA software.

Findings: The empirical results show that the adoption of IFRS 15 did not have a statistically significant effect on either accrual-based or real earnings management. They remain robust

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after controlling for various determinants of earnings management and are further supported by robustness checks using entropy balancing.

The findings invite standard setters to further assess whether the new revenue recognition standard, IFRS 15, has achieved its goal of enhancing financial reporting quality.

Contribution: To the best of our knowledge, this is the first study to provide a comprehensive examination of both accrual-based and real earnings management in the European context, comparing the pre- and post-mandatory IFRS15 adoption periods.

Keywords: IFRS 15, Revenue recognition, Earnings quality, Discretionary accruals, Real activities, Entropy balancing.

JEL codes: M41, M48

1. Introduction

Revenue is one of the key performance indicators of a company for a given period. As such it must be properly recognized in accounting and is subject to regulation. To this end, the Financial Accounting Standards Board (hereafter, FASB) and the International Accounting Standards Board (hereafter, IASB) jointly issued, in May 2014, International Financial Reporting Standard (hereafter, IFRS) 15 "*Revenue from Contracts with Customers*". This standard follows fairly closely the requirements of the American Accounting Standard Codification (hereafter, ASC) 606[i] and provides a single source, comprehensive framework for revenue recognition across all entities and industries. It was adopted by the European Union in September 2016 (CE n°2016/1905) and became mandatory for annual periods beginning on or after January 1, 2018 with early adoption permitted.

The issuance of this new revenue recognition standard[ii] has gained much attention and financial reporting was expected to enter a period of "*unprecedented change*" (Hepp, 2018). Several studies have discussed its impacts on financial reporting including changes in recognition, presentation and disclosure (Karim & Riya, 2022; Krupova & Partac, 2022; Kobbi-Fakhfakh & Boujelben, 2021; Boujelben & Kobbi-Fakhfakh, 2020; Napier & Stadler, 2020). A limited number of empirical studies have also explored its effects on earnings quality, but their findings remain mixed (Soodsook *et al.*, 2024; Yassin *et al.*, 2024; Souza *et al.*, 2022; Morawska, 2021; Piosik, 2021; Lee & Lee, 2020). These inconsistencies may stem from the substantive changes introduced by IFRS15. In this regard, Rutledge *et al.* (2016: 47) noted that "*this new guidance can be a double-edged sword*", suggesting that earnings quality could be affected in either a positive or negative direction.

Indeed, the primary objectives of IFRS 15 are to ensure a more accurate revenue representation of revenue and to improve comparability across entities and

industries (FASB, 2014; Lemus, 2014), while also aiming to reduce the steering and misuse of revenue for earnings management purposes (Yassin *et al.*, 2024; Kim, 2022; Napier & Stadler, 2020). However, the adoption of a single, principles-based model for revenue recognition allows managers considerable discretion, particularly in estimating performance obligations and determining the timing of their satisfaction (Rutledge *et al.*, 2016; Jones & Pagach, 2013). Drawing on insights from agency theory (Jensen & Meckling, 1976), this discretion could be exploited by managers to engage in opportunistic earnings management, thereby undermining earnings quality (Yassin *et al.*, 2024; Kim, 2022; Lee & Lee, 2020; Rutledge *et al.*, 2016).

Therefore, building on the preceding arguments and drawing on limited prior empirical evidence, the effect of IFRS 15 on earnings quality is not yet determinable and clear. Furthermore, to the best of our knowledge, no study to date has specifically examined the effect of IFRS 15 implementation on real earnings management. To fill this gap, the present study investigates whether the adoption of IFRS 15 affects earnings quality, focusing on both accrual-based and real earnings management practices.

To achieve this objective, we selected a sample of 3,327 firm-year observations from non-financial companies listed on the STOXX Europe 600 index, covering a 12-year period around the mandatory adoption of IFRS 15 (2012-2023). We adopted a difference-in-differences (DiD) research design to compare changes in earnings management practices before and after the implementation of IFRS15. Our results indicate that the IFRS15 mandatory adoption is not associated with significant changes in either accrual-based or real earnings management practices.

This study contributes to existing literature in three main ways. First, it adds to the empirical literature on the effect of IFRS implementation on earnings management by examining a specific standard that addresses a core financial performance indicator i.e., Revenue. Given the centrality of revenue in financial reporting, investigating earnings management through the lens of IFRS 15 provides a deeper understanding of its real impacts.

Second, the study responds to Rutledge *et al.*'s (2016) call to empirically examine the actual direction of the effect of IFRS 15 adoption on earnings quality measurements. Indeed, regarding the new guidance in revenue recognition, such direction is not clear ex-ante. Hence, this study contributes by offering empirical clarity on this issue.

Third, empirical evidence on the effects of IFRS 15 on earnings management is scarce. To the best of our knowledge, apart from the studies by Morawska (2021) and Piosik (2021) (in the Polish context), Lee and Lee (2020) and Yassin *et al.*

(2024) (in the U.S. context), Souza *et al.* (2022) (in the Brazilian context), and Soodsook *et al.* (2024) (in Thai context), no other studies have investigated this research question. Moreover, previous research often relied on quarterly data or short timeframes, and primarily focused on accrual-based earnings management without specifically testing for real earnings management. This study addresses this gap by examining both forms of earnings management over an extended period (2012-2023), thereby offering a broader insight into the potential effect of IFRS 15 on earnings management in the European context.

The next section presents the research background. Section 3 develops research hypotheses. Section 4 outlines the research design. Section 5 presents and discusses the empirical findings of the study. Section 6 provides robustness checks. Section 7 concludes the study.

2. Revenue recognition reform in the EU context: from legacy standards to IFRS 15 adoption

In September 2016, the European Union adopted IFRS 15 (CE n°2016/1905). This standard became effective for fiscal years beginning on or after January 1, 2018. It superseded the legacy revenue recognition requirements, including International Accounting Standard (hereafter, IAS)11 "*Construction contracts*", IAS18 "*Revenue*", and related interpretations such as: International Financial Reporting Interpretations Committee (hereafter, IFRIC) 13 "*Customer Loyalty Programs",* IFRIC 15 "*Agreements for the Construction of Real Estate*", IFRIC 18 "*Transfers of Assets from Customers*", and Standard Interpretations Committee (hereafter, SIC) 31 "*Revenue-Barter Transactions Involving Advertising Services*".

The adoption of IFRS 15 represents a shift from a rules-based approach to a principles-based approach (Lee & Lee, 2020). According to several practitioner-based studies (Ernst and Young, 2019-2020; KPMG, 2019; BDO, 2018; ESMA, 2018), IFRS 15 introduced substantial changes in both the principles and disclosure requirements on revenue recognition. The key differences between IFRS 15 and the legacy standards can be grouped into three main areas: scope, accounting treatment, and presentation/disclosure requirements. Specifically, IFRS 15 applies to all contracts with customers, unless they fall the scope of another IFRS. It introduces a standardized five-step model that is applicable across all industries: (1) Identify the contract(s) with a customer, (2) identify the performance obligation(s), (3) determine the transaction price, (4) allocate the transaction price to the performance obligation(s) in the contract and (5) recognize revenue when (or as) the performance obligation is satisfied.

IFRS 15, also, provides detailed guidance for application in specific cases and expands disclosure requirements to include both qualitative and quantitative

information (KPMG, 2019; FRC, 2019). In this regard, the standard requires entities to disclose information about their contracts with customers, including the significant judgements-and changes in the judgements- made in applying the standard, as well as any assets recognized from the costs to obtain or fulfil a contract with a customer (IFRS 15, § 110). The primary objective is to better inform users of financial statements about the nature, the timing and the amount of recognized revenue from contracts with customers.

Table 1 summarizes the key differences between IFRS 15 and the previous revenue recognition standards (for more discussion of the main changes introduced by IFRS 15, see Kobbi-Fakhfakh & Boujelben, 2021).

Table 1. Key differences between IFRS 15 and legacy revenue recognition requirements

Legacy revenue recognition requirements	IFRS 15
IFRS/US GAAP divergences	IFRS/US GAAP convergence
Separate models: • Revenue; • Construction contracts; • Specific transactions (IFRIC 13, IFRIC 15, IFRIC 18 and SIC 31).	A single 5-step model for all types of transactions in all sectors
General and less explicit principles	More prescriptive and detailed rules, but requiring a lot of judgment
• Transfer of risks and rewards • Possibility of bundling goods and services (*IAS 18*)	• Transfer of control • Separate promised goods and services that are distinct and account them as separate performance obligations

3. Hypotheses development

Revenue, as the top-line of the income statement, is widely regarded as one of the most important components of financial reporting (Rutledge *et al.*, 2016), enabling stakeholders to assess an entity's financial performance and gain insight into its future prospects (CFA Institute, 2017). This key performance indicator is directly linked to earnings, as revenue recognition is typically accompanied by the recognition of associated expenses, notably the cost of sales (Napier & Stadler, 2020). Revenue is also subject to managerial discretion (Stubben, 2010). As early as 1998, Arthur Levitt warmed that "manipulation of revenue recognition is one of five popular earnings management tricks employed to ''mask the true consequences of management's decisions"[iii].

Prior literature on the effects of IFRS 15 on earnings quality is scarce. Measuring the quality of reported earnings is inherently complex, as it encompasses several

attributes that are not directly observable. It may refer to reduced earnings management, timely loss recognition, and increased value relevance (Cameran *et al.*, 2014). Earnings quality can also be associated with stability and persistence, which enhance the reliability of future cash-flows forecasts (García-Sánchez & García-Meca, 2017). In the literature, various proxies have been used to assess earnings quality, including earnings persistence, accruals quality, value relevance, and earnings management etc. (Rutledge *et al.*, 2016)[iv].

There are two competing views on the impact of IFRS 15 adoption on earnings quality. On the one hand, IFRS 15 establishes a more comprehensive and robust revenue recognition framework based on a single five-step model. Its main objectives are to better inform users about the nature, the timing and the amount of recognized revenue from contracts with customers. According to Lemus (2014), the new standard aims to remove the shortcomings and inconsistencies of legacy revenue recognition standards. As a result, it is expected to enhance comparability across entities and industries and reduce opportunities for earnings manipulation through revenue steering (Yassin *et al.*, 2024; Kim, 2022; Napier & Stadler, 2020), thereby improving earnings quality (Rutledge *et al.*, 2016). In this context, and using an industry-focused approach, Choi *et al.* (2022) found that the adoption of ASC 606 enhanced the comparability and informativeness of financial statements, as well as the alignment of revenue accruals with cash collections, for firms in the software industry (treatment group) compared to firms in the electronic computer industry (control group).

On the other hand, although the IASB argued that IFRS 15 enhances transparency and financial reporting quality, some authors (Souza *et al.*, 2022; Huefner, 2016; Rutdledge, 2016) pointed out that the new standard may actually lead to lower earnings quality through the misuse of revenue recognition. Indeed, in applying IFRS15, managers are required to make significant judgements and estimates, which may generate greater opportunities for revenue management practices, thereby affecting earnings quality (Lee & Lee, 2020). These judgements and estimates relate primarily to the timing of the satisfaction of performance obligations, the determination of the transaction price, and the allocation of that price to performance obligations (IFRS15, paragraphs 123-126). In this regard, Rutledge *et al.* (2016: 45) asserted that "earnings quality may be reduced because the new standard will increase deferred tax balances, and provide executives with increased opportunity to manage earnings". Similarly, Kim (2022) suggested that IFRS 15 may reduce the informative value of revenue deferrals. In the same vein, Yassin *et al.* (2024) argued that the adoption of ASC 606, the U.S. equivalent of IFRS15, is believed to increase managerial discretion in revenue recognition. Likewise, Rutledge *et al.* (2016) emphasized that IFRS 15 adoption could lead to book-tax differences, which may negatively impact earnings persistence and, consequently, earnings quality.

In the Italian context, Tutino *et al.* (2019) discussed the possible impact of IFRS 15 adoption on earnings management by carrying out a comparative analysis of the extent of the discretionary accruals between entities operating in the "Telecommunications" sector compared with those operating in "Utilities" sector. They found a significant difference between the two sectors. They argued that these results should be analyzed in conjunction with the Big4 sector analysis, which predicted that the "Telecommunications" ("Utilities") sector would be highly (less) affected by IFRS 15. They suggested that understanding in advance which industries are more impacted by earnings management practices allows for anticipating how managers might act when implementing IFRS 15 (Tutino *et al.*, 2019). Napier and Stadler (2020) proposed a framework for understanding the potential effects of IFRS15 implementation, including accounting effects (such as recognition, presentation and disclosure changes), information effects (the impact of internal and external users' understanding of transactions and how these effects are communicated to stakeholders), and real effects (implementation and application costs, contractual changes, behavioral effects, regulatory effects, tax and dividend effects, among others). By analyzing annual reports, comment letters from entities within the STOXX Europe 50, and conducting interviews, they concluded that while the implementation of IFRS15 required considerable effort, it did not lead to substantial changes in reported accounting numbers for most firms (Napier & Stadler, 2020).

Empirical evidence on the effects of adopting the new revenue recognition standard (IFRS15 or ASC 606) on earnings quality is scarce and has yielded mixed results. In the Polish context, Morawska (2021) investigated whether IFRS 15 adoption affected earnings management through discretion in revenue recognition. Using Caylor's (2010) revenue-based model, he found no statistically significant link between IFRS 15 adoption and abnormal changes in short-term deferred revenue and gross account receivables (accrued revenue) intended to avoid losses and earnings declines. In the same context, Piosik (2021) found that IFRS 15 adoption mitigated the increase in discretionary revenue (estimated by adopting the Stubben's (2010) approach) when pre-managed operating income was slightly lower than analysts' forecasts for the fourth quarter's operating income. However, it did not affect revenue and net earnings. He established that IFRS 15 adoption in Poland did not deteriorate the quality of reported operating income (Piosik, 2021).

However, empirical studies such as Lee and Lee (2020), Souza *et al.* (2022), Soodsook *et al.* (2024), and Yassin *et al.* (2024) showed that the new revenue recognition standard (IFRS 15/ASC 606) implementation has affected earnings quality. Lee and Lee (2020) found that earnings quality deteriorated post-ASC606 adoption, as evidenced by decreased earnings predictability and increasing abnormal accruals, thereby reducing the usefulness and reliability of earnings in contracting. Specifically, using a difference-in-differences design, the authors showed a positive and significant impact of ASC 606 adoption on the discretionary noncash working capital accruals of firms materially affected by ASC 606, compared to those not materially affected[v]. In the same line of thoughts, Souza *et al.* (2022) examined the

impact of IFRS 15 adoption on earnings quality proxied by the quality of accruals (using Dechow & Dichev's (2002) model) and earnings management (using Pae's (2005) model), over the period 2011-2021. Overall, they found that IFRS15 adoption did not significantly improve earnings quality for publicly held Brazilian firms. Nevertheless, by performing a sectoral analysis and considering the sectors most "influenced" by IFRS 15 implementation, they found that the quality of accruals decreased in the technology sector, while earnings management increased in the industrial products sector. The authors concluded that the effect of IFRS 15 on earnings quality depends on the sector in which the entity operates (Souza *et al.*, 2022).

In the Thai context, Soodsook *et al.* (2024) investigated the effects of IFRS 15 implementation on earnings quality, proxied by four attributes: predictability, smoothness, accrual measure, and value relevance. They found an overall improvement in earnings quality, which was more pronounced in the "Information Technology" and "Real Estate" industries (Soodsook *et al.*, 2024). Based on an online questionnaire sent to financial reporting preparers in U.S. publicly traded firms, Yassin *et al.* (2024) showed that variable consideration under ASC 606 enhanced the use of earnings management practices during COVID 19 pandemic. They documented that this consideration was used as a tool to manipulate earnings, helping entities survive the pandemic crisis (Yassin *et al.*, 2024).
Drawing on insights from the aforementioned theoretical arguments and empirical evidence, we assume that the adoption of the new revenue recognition standard i.e., IFRS 15 is likely to affect earnings quality, although this effect is not clear ex-ante. Indeed, earnings quality may be affected in either upward or downward direction. However, it is also possible that the implementation of IFRS 15 results in negligeable changes.

This study uses earnings management as a proxy for earnings quality. It examines changes in both accrual-based and real earnings management practices between the pre- versus post-mandatory IFRS 15 adoption periods. Therefore, we formulate the following null hypotheses:
Hypothesis 1 (H1): Mandatory IFRS 15 adoption is not associated with a change in accrual earnings management practices.
Hypothesis 2 (H2): Mandatory IFRS 15 adoption is not associated with a change in real earnings management practices.

4. Research design

4.1 Measurement of variables

4.1.1 IFRS 15 adoption (IFRS 15)

The mandatory adoption of IFRS 15 took effect in 2018 (CE n°2016/1905). Accordingly, we measured IFRS15 adoption using a dummy variable that takes the value 1 for all fiscal years during which the standard was in effect (2018-2023), and 0 otherwise (2012-2017). Thus, we consider the post-IFRS 15 implementation

period (post-IFRS15) as beginning in 2018.

4.1.2 Earnings management (EM)

4.1.2.1 Accrual-based earnings management

Following prior literature (Nguyen *et al.*,2023; Lee & Lee, 2020; Kousay, 2019; Tutino, 2019; Doukakis, 2014), we used discretionary (or abnormal) accruals as a proxy for accrual-based earnings management. Discretionary accruals are calculated as the difference between a firm's total accruals and its normal level of accruals, referred to as non-discretionary accruals. Total accruals are defined as the difference between net income and operating cash flow.

The most widely used model for estimating discretionary accruals is the modified Jones model (Dechow *et al.*, 1995). To account for potential manipulation in revenue recognition, Dechow *et al.* (1995) added changes in accounts receivable into the original Jones model (1991).

Consistent with prior studies (Lee & Lee, 2020; Kousay, 2019; Doukakis, 2014), we adopted the modified Jones model (Dechow *et al.*, 1995) to estimate discretionary accruals, which is specified as follows:

$$\frac{TACC_t}{A_{t-1}} = \alpha_1 \frac{1}{A_{t-1}} + \alpha_2 \frac{(\Delta REV_t - \Delta REC_t)}{A_{t-1}} + \alpha_3 \frac{PPE_t}{A_{t-1}} + \varepsilon_t \quad (1)$$

$TACC_t$: Total accruals in year t,
A_{t-1} : Total assets in year t-1,
ΔREV_t : Change in revenue in year t,
ΔREC_t : Change in net receivables in year t,
PPE_t : Gross property plant and equipment in year t,
$\alpha_1, \alpha_2, \alpha_3$: Parameters,
ε_t : Residual in year t.

The estimated residual represents the extent of discretionary accruals for each observation. This study uses the absolute value of discretionary accruals (ABSDA) as a proxy for accrual-based earnings management, as hypothesis (H1) does not predict the direction of earnings management.

4.1.2.2 Real earnings management

In 2006, Roychowdhury developed three real earnings management measures that have been widely used in the literature (Nguyen *et al.*, 2023; Boulhaga *et al.*, 2022; Doukakis, 2014; Zang, 2012; Cohen & Zarowin, 2010). These include the abnormal level of cash flows from operations (ABNCFO), the abnormal level of production costs (ABNPROD), and the abnormal level of discretionary expenses (ABNDISX). These three measures are estimated using the following models:

Model 1:

$$\frac{CFO_t}{A_{t-1}} = \beta_0 + \beta_1\left(\frac{1}{A_{t-1}}\right) + \beta_2\left(\frac{S_t}{A_{t-1}}\right) + \beta_3\left(\frac{\Delta S_t}{A_{t-1}}\right) + \varepsilon_t \quad (2)$$

Where:

CFO_t: Operating cash flow in year t,

A_{t-1}: Total assets in year t-1,

S_t: Total sales during the year t,

ΔS_t: Change in total sales in year t: S_t - S_{t-1},

$\beta_1, \beta_2, \beta_3$: Parameters,

ε_t : Residual in year t.

The estimated residual represents the abnormal level of cash flow from operations (ABNCFO) for each observation. Based on observed sales levels, firms engaging in upward earnings management are expected to exhibit abnormally low cash flow from operations (Cohen & Zarowin, 2010).

Model 2:

$$\frac{PROD_t}{A_{t-1}} = \beta_0 + \beta_1\left(\frac{1}{A_{t-1}}\right) + \beta_2\left(\frac{S_t}{A_{t-1}}\right) + \beta_3\left(\frac{\Delta S_t}{A_{t-1}}\right) + \beta_4\left(\frac{\Delta S_{t-1}}{A_{t-1}}\right) + \varepsilon_t \quad (3)$$

$PROD_t$: Production costs in year t. They are calculated by the sum of the cost of goods sold and the change in inventories for the firm in the year t.

ΔS_{t-1}: Change in total sales in year t: S_{t-1} - S_{t-2},

$\beta_1, \beta_2, \beta_3, \beta_4$: Parameters,

ε_t : Residual in year t.

The estimated residual represents the abnormal level of production costs (ABNPROD) for each observation. Based on observed sales levels, firms engaging in upward earnings management are expected to exhibit abnormally high production costs (Cohen & Zarowin, 2010).

Model 3:

$$\frac{DISEXP_t}{A_{t-1}} = \beta_0 + \beta_1\left(\frac{1}{A_{t-1}}\right) + \beta_2\left(\frac{S_{t-1}}{A_{t-1}}\right) + \varepsilon_t \quad (4)$$

$DISEXP_t$: Discretionary expenses in year t. It is measured as the sum of R&D expenses, advertising expenses and Selling, General & Administrative expenses.

S_{t-1} : Total sales during year t-1

β_1, β_2 : Parameters,

ε_t : Residual in year t.

The estimated residual represents the abnormal level of discretionary expenses (ABNDISX) for each observation. Based on observed sales levels, firms that engaging in upward earnings management are expected to exhibit abnormally reduced discretionary expenses (Cohen & Zarowin, 2010).

Furthermore, in line with Doukakis (2014), Zang (2012) and Cohen and Zarowin (2010), we multiplied ABNCFO and ABNDISX by minus one. As a result, higher values of ABNCFO and ABNDISX indicate a greater propensity for firms to manipulate sales through price discounts or cutting discretionary expenses. Following Cohen *et al.* (2008), we then computed a combined metric of real earnings management (REM) as follows:

REM = ABNPROD[vi] - ABNCFO - ABNDISX (5)

4.2 Model Specification

To test the research hypotheses, we performed a difference-in-differences (DiD) model including industry, country and year fixed effects. The model is specified as follows:

$EM_{i,t}=\square_0+\square_1(IFRS15)_{i,t}\square\square_2(MATERIAL)_{i,t}\square\square_3(IFRS15*MATERIAL)_{i,t}+\beta_n(CONTROLS)_{i,t}+\varepsilon_{i,t}$ (I)

The dependent variable, EM, refers to the various proxies for earnings management including the absolute value of the discretionary accruals (ABSDA) and the four proxies for real earnings management: the abnormal level of cash flows from operations (ABNCFO), the abnormal level of production costs (ABNPROD), the abnormal level of discretionary expenses (ABNDISX), as developed in Roychowdhury (2006), and the combined measure of real earnings management (REM), as computed in Cohen *et al.* (2008)[vii]. IFRS15 is a time dummy that takes the value of 1 (0 otherwise) beginning in the financial year when IFRS15 adoption becomes mandatory i.e., 2018.

Since IFRS 15 is measured as a time dummy variable, there are concerns about potential confounding events, such as economic factors (e.g., the COVID 19 pandemic) or changes in other standards, such as IFRS 9 and IFRS 16, which may differentially affect firms' earnings management behavior. To address this concern, we employed a difference-in-differences design, which requires a suitable control sample that should closely resemble the treatment group (Doukakis, 2014; Meyer, 1995).

Prior empirical studies have shown that the effect of IFRS 15 implementation varies across firms and industries. Indeed, Tutino *et al.* (2019) argued that understanding in advance which industries are more impacted by earnings management practices can help anticipate how managers might respond when implementing IFRS 15. In this regard, Souza *et al.* (2022) demonstrated that the impact of IFRS 15 on reported earnings quality depends on the sector in which the entity operates. Similarly, Lee and Lee (2020) found that the adoption of ASC 606 positively affects the discretionary noncash working capital accruals of firms materially affected by ASC 606, compared to those not materially affected.

Therefore, following Lee and Lee (2020), we consider firms that were not materially affected by the implementation of IFRS15 as a suitable control sample to test the effect of the standard on earnings management. Particularly, the control group includes firms that explicitly disclosed in their annual reports that the mandatory adoption of IFRS 15 did not have a significant effect on their financial statements (hereafter, NO-MATERIAL sample). Accordingly, we deployed the dummy variable MATERIAL as a quasi-treatment indicator in our regression model. MATERIAL equals 1 (0 otherwise) for firms that explicitly stated in their annual reports that the first-time adoption of IFRS 15 in 2018 had a significant impact on their financial statements (hereafter, MATERIAL sample).

To measure the MATERIAL variable, we performed a textual analysis of the 2018 annual reports, focusing specifically on the notes and disclosures. We searched for key terms such as "material impact," "significant effect," "material changes," "material adjustments," "substantial impact," and similar expressions explicitly linked to the adoption of the new revenue recognition standard. Firms were coded as 1 (treatment group) if they explicitly mentioned a material or significant impact on revenues, profits, contracts, or financial statement components due to the adoption of IFRS 15. Firms were coded as 0 (control group) if they either stated that the impact was not significant, mentioned limited or immaterial effects, or described the impacted areas without specifying the materiality.

As illustrative examples, KONE disclosed (Annual Report 2018: 32): “Application of new revenue recognition principles under IFRS 15 has a material impact on KONE’s consolidated financial statements”. CARLSBERG stated (Annual Report 2018: 119): “For the Group, the implementation of IFRS 15 was material to the consolidated financial statements”. ACS noted (Annual Report 2018: 43): “With effect from January 1, 2018, IFRS 15 and IFRS 9 were applied, with the most significant impacts arising from the application of IFRS 15 and, to a lesser extent, IFRS 9”. These firms are classified in the treatment group.

In contrast, for the control group, KERRY GROUP disclosed (Annual Report 2018: 154): “The impact of adopting IFRS 15 on the consolidated financial statements was not material for the Group”. AKZO NOBEL stated (Annual Report 2018: 96):” The application of IFRS 15 did not result in a significant impact on our consolidated financial statements”. Similarly, ARCADIS noted (annual report 2018: 178): “The impact of IFRS 15 is limited”.

The main coefficient of interest in the regression model is β_3. It provides an estimate of the impact of IFRS15 on EM for the treatment group relative to the control group in the post-adoption period. We interpret a significant coefficient on the interaction term IFRS15*MATERIAL as evidence that the IFRS 15 mandatory adoption is associated with a change in the earnings management practices of firms materially

affected by IFRS 15 (the MATERIAL sample), relative to those not materially affected (the NO-MATERIAL sample).
The control group has the same institutional and governance characteristics as the treatment group. In addition, it encounters similar environment changes during the study period, making it a more appropriate control group[viii]. Indeed, both groups are all listed on the STOXX Europe 600 Index. This common institutional setting helps isolate the effect of IFRS 15 adoption on earnings management by minimizing the influence of external contextual factors[ix].

$(CONTROLS)_{i,t}$ is a vector of control variables that includes firm-specific characteristics previously shown in the literature to be associated with earnings management (Souza *et al.*, 2022; Lee & Lee, 2020). These characteristics include firm size (FSIZE), leverage (LEV), profitability (ROA), growth (MBV), and audit firm size (BIG4).

We also included country, industry, and year fixed effects in the regression model to control for the effect of unobservable country, industry and time factors. Table 2 summarizes the measurements of all study variables. We collected data on firm characteristics from the DataStream database.

4.3 Sample Selection

The population for the sample consists of all non-financial firms listed on the STOXX 600 Europe Index. Initially, 464 listed firms active in the Datastream database were identified. From these we excluded those whose start dates in the Datastream fall within our study period (2012-2023), as well as firms that do not use the calendar year as their fiscal year. These exclusions help ensure a certain level of homogeneity in the sample and avoid potential analytical issues.

This initial screening resulted in a sample of 318 listed firms. A content analysis of their annual reports was then performed to measure the MATERIAL variable. Firms whose annual reports were unavailable or difficult to analyze were excluded[x]. An additional 13 firms were also dropped for various reasons, including non-adoption of IFRS[xi], lack of any reference to IFRS 15 in their annual reports[xii], or voluntary early adoption of IFRS15[xiii]. This latter criterion allows us to focus on a homogeneous sample of mandatory adopters.

Table 2. Measurement of variables

ACRONYMS	DEFINITIONS	MEASURES
EM1	Accrual-based earnings management	ABSDA: The absolute value of discretionary accruals using the modified Jones model (Dechow *et al.*, 1995)
EM2	Real earnings management	1/ABNCFO: The abnormal level of cash flows from operations computed as in Roychowdhury (2006)

ACRONYMS	DEFINITIONS	MEASURES
	proxies	2/ABNPROD: The abnormal level of production costs computed as in Roychowdhury (2006)
		3/ABNDISX: The abnormal level of discretionary expenses computed as in Roychowdhury (2006)
		4/ REM: The sum of the three real earnings management proxies computed as in Cohen et al. (2008). REM= ABNPROD -ABNCFO - ABNDISX
IFRS 15	IFRS 15 adoption	1 (0 otherwise) beginning in the year in which IFRS 15 becomes effective
MATERIAL	Materiality	1 (0 otherwise) for firms that explicitly disclosed, in their annual reports, that the first-year IFRS 15 adoption had significantly affected their financial statements.
FSIZE	Firm size	Natural logarithm of total assets
LEV	Leverage	Total debt/Total assets
ROA	Profitability	Net income/Total assets
MBV	Growth	Market-to-book ratio
BIG4	Audit firm size	1 (0 otherwise) if the firm is audited by a top four audit firm
INDUS-FE	Industry fixed effects	Dummies variables to control for industry type
COUNTRY-FE	Country fixed effects	Dummies variables to control for country
YEAR-FE	Year fixed effects	Dummies variables to control for year

This selection process yielded a sample composed of 303 listed firms and a total of 3,636 firm-year observations. We, then, excluded firm-year observations with missing data from any of the variables needed.
Table 3 outlines the sample selection procedure. The final sample includes a total of 3,327 firm-year observations (Table 3, Panel A). Panels B and C of Table 3 display, respectively, the sample split by country and by industry[xiv].

The firms of the sample are domiciled in 17 European countries (Table 3, Panel B). Panel B of Table 3 shows that the UK, France, Germany and Sweden account for a relatively greater proportion of the 17 countries covered for the sampled firms which is respectively 15.45%, 15.96%, 13.28% and 10.46%. Furthermore, most of the firms included in the study belong to the "industrials" industry followed by "consumer discretionary", "health care", "basic materials" and "consumer staples" industries (Table 3, Panel C).

Table 3. Summary of the sample selection process and sample characteristics

PANEL A: SAMPLE SELECTION PROCEDURE	
Non-financial firms listed on the STOXX Europe 600 Index.	464
Excluding firms:	
✓ Whose start dates are within the study period	(63)
✓ Without calendar year	(83)
✓ Whose annual reports are unavailable or difficult to exploit	(2)
✓ Which did not adopt IFRS	(9)
✓ Without any reference to IFRS 15	(1)
✓ which early adopt IFRS 15	(3)
Number of firms in the initial sample	303
Total initial firm-year observations	3,636
Excluding firm-year observations due to missing values	(309)
Total final firm-year observations	**3,327**

PANEL B: DISTRIBUTION OF FIRM-YEAR OBSERVATIONS BY COUNRTY		
Country	**Number of observations**	**Percentage**
Austria	48	1.44%
Belgium	68	2.04%
Denmark	156	4.69%
Finland	148	4.45%
France	531	15.96%
Germany	442	13.29%
Ireland	60	1.80%
Italy	200	6.01%
Luxembourg	36	1.08%
The Netherlands	167	5.02%
Norway	142	4.27%
Poland	34	1.02%
Portugal	36	1.08%
Spain	135	4.06%
Sweden	348	10.46%
Switzerland	262	7.87%
United Kingdom	514	15.45%
TOTAL	**3,327**	**100.00%**

PANEL C: DISTRIBUTION OF FIRM-YEAR OBSERVATIONS BY INDUSTRY		
Industry type (ICB classification)	**Number of observations**	**Percentage**
10- Technology	176	5.29%
15- Telecommunications	156	4.69%
20- Health Care	389	11.69%
40- Consumer Discretionary	439	13.20%
45- Consumer staples	368	11.06%
50- Industrials	1053	31.65%
55- Basic Materials	382	11.48%
60- Energy	175	5.26%
65- Utilities	189	5.68%
TOTAL	**3,327**	**100.00%**

5. Results and discussion

5.1 Descriptive Statistics

To mitigate the undesirable effect of outliers, all continuous independent variables are winsorized at the 1st and 99th percentiles. Table 4 outlines the descriptive statistics for the study variables. Table 4 presents descriptive statistics for firm characteristics used as control variables in the analysis. It shows differences between the treatment (MATERIAL) and the control group (NO-MATERIAL). On average, firms in the treatment group are larger, more leveraged, less profitable, and exhibit lower growth. The proportion of firms audited by Big4 auditors remains high in both groups.

Regarding EM proxies, Table 4 indicates that for the treatment group, ABSDA ranges from 0.023 to 0.076, with a mean of 0.043, while for the control group il ranges from 0.016 to 0.081, with a mean of 0.042. ABNCFO ranges from 0.064 to 0.189 (mean=0.096) in the treatment group, compared to 0.056 to 0.278 (mean=0.107) in the control group. ABNPROD ranges from -0.026 to 2.033 (mean=0.494) in the treatment group, versus -0.152 to 2.141 (mean=0.580) in the control group. Lastly, ABNDISX varies between 0.127 and 0.280 in the treatment group (mean=0.176), compared to a range of 0.105 to 1.377 in the control group (mean=0.211).

Table 5 presents the univariate analysis of the different EM proxies used in our models for the treatment and control groups. A t-test and a Wilcoxon test are employed to compare the pre and post IFRS 15 periods, and explore potential differences. For both the treatment and control groups, the mean of ABSDA does not differ significantly between the pre- and post-IFRS 15 adoption periods. In contrast, the means of ABNCFO, ABNPROD and ABNDISX are significantly lower for both the MATERIAL and NO-MATERIAL samples after the adoption of IFRS 15. However, the mean of REM is significantly lower only for the MATERIAL sample following IFRS 15 adoption.

Overall, the univariate analysis suggests no significant change in accrual-based earnings management, but a significant decrease in real earnings management after IFRS 15 came into effect. Nevertheless, excluding the combined measure (REM), the decline in real earnings management activities is observed in both the treatment and control groups following the implementation of IFRS 15.

To test for multicollinearity, Table 6 presents the correlation coefficients among all independent variables included in the regression model. Pearson correlations are reported in the bottom left and Spearman correlations at the top right. The magnitude and direction of both the parametric and non-parametric coefficients are very similar and relatively low, suggesting that multicollinearity is unlikely to be an issue in our regression estimates[xv].

Table 4. Summary descriptive statistics for variables

Variables	Control group: NO-MATERIAL sample					Treatment group: MATERIAL sample				
	N	Mean	SD	Min	Max	N	Mean	SD	Min	Max
ABSDA	3,122	0.042	0.012	0.016	0.081	205	0.043	0.014	0.023	0.076
ABNCFO	3,122	0.107	0.028	0.056	0.278	205	0.096	0.016	0.064	0.189
ABNPROD	3,122	0.580	0.403	-0.152	2.141	205	0.494	0.294	-0.026	2.033
ABNDISX	2,415	0.211	0.092	0.105	1.377	153	0.176	0.036	0.127	0.280
REM	2,415	0.226	0.340	-1.543	1.556	153	0.194	0.236	-0.277	1.563
IFRS 15	3,122	0.499	0.500	0	1	205	0.493	0.501	0	1
FSIZE	3,122	16.365	1.558	12.924	19.809	205	17.059	1.296	14.357	19.486
LEV	3,122	0.243	0.138	0	0.621	205	0.306	0.163	0	0.621
ROA	3,122	0.072	0.060	-0.087	0.292	205	0.056	0.059	-0.087	0.292
MBV	3,122	3.395	2.777	0.19	14.99	205	2.846	2.318	0.19	14.99
BIG 4	3,122	0.952	0.213	0	1	205	0.941	0.235	0	1

Note. This table reports the descriptive statistics for the study variables included in the regression model for MATERIAL and NO-MATERIAL groups. The sample selection process is described in Table 3, and all variables are defined in Table 2. All continuous independent variables are winsorized at the 1st and 99th percentiles.

Table 5. Univariate analysis: Comparison tests

Variables	Treatment group: MATERIAL sample					Control group: NO-MATERIAL sample				
	N	Pre-IFRS15	Post-IFRS15	t-test	Wilcoxon test	N	Pre-IFRS15	Post-IFRS15	t-test	Wilcoxon test
ABSDA	205	0.043	0.044	-0.817	-0.977	3122	0.042	0.043	-0.946	-0.927
ABNCFO	205	0.098	0.094	2.213**	2.758***	3122	0.111	0.104	7.554***	5.773***
ABNPRO	20	0.52	0.46	1.56	1.929*	312	0.60	0.55	3.687**	3.787**

Variables	Treatment group: MATERIAL sample					Control group: NO-MATERIAL sample				
	N	Pre-IFRS15	Post-IFRS15	t-test	Wilcoxon test	N	Pre-IFRS15	Post-IFRS15	t-test	Wilcoxon test
D	5	5	2			2	7	4	*	*
ABNDISX	153	0.185	0.167	3.209***	3.095***	2415	0.227	0.195	8.707***	7..231***
REM	153	0.229	0.161	1.787*	2.401**	2415	0.230	0.221	0.627	1.031

Note. This Table reports comparisons tests of earnings management practices between pre- and post-IFRS 15 periods and by MATERIAL and NO-MATERIAL groups. The sample selection process is described in Table 3, and all variables are defined in Table 2. ***, ** and * indicate significance level at the 1%, 5% and 10% respectively

Table 6. Correlation matrix

	1	2	3	4	5	6	7
1. IFRS 15	**1.000**	-0.003	0.128***	0.116***	-0.002	0.067***	0.001
2. MATERIAL	-0.003	**1.000**	0.110***	0.086***	-0.054***	-0.039**	-0.012
3. FSIZE	0.137***	0.106***	**1.000**	0.223***	-0.319***	-0.292***	0.064***
4. LEV	0.112***	0.109***	0.235***	**1.000**	-0.267***	-0.052***	0.032*
5. ROA	-0.013	-0.063***	-0.287***	-0.277***	**1.000**	0.554***	0.036**
6. MBV	0.099***	-0.048***	-0.256***	-0.026	0.532***	**1.000**	0.031*
7. BIG 4	0.001	-0.012	0.063***	0.011	-0.008	0.026	**1.000**

Note. This Table reports the correlation matrix using 3,327 firm-year observations from 2012 to 2023. All continuous variables are winsorized at the 1st and 99th percentiles. The bottom left half of the table contains Pearson's parametric correlation coefficients, while the upper right half of the table shows Spearman's non-parametric correlation coefficients. *** and **denote significant at the 1% and 5% levels, respectively

5.2 Empirical results and discussion

To test the research hypotheses, we estimated linear regression model with panel data using STATA 13 Software. Several econometric tests were performed, including tests of specification, heteroscedasticity and autocorrelation. The "*Breusch-Pagan"* and "*Wooldridge"* tests indicate the presence of both heteroscedasticity and autocorrelation problems, respectively. To achieve robust estimations and mitigate the presence of these problems, we estimated our models

using "*Feasible Generalized Least Squares*" (FGLS).
Our hypotheses test the effect of the mandatory adoption of IFRS 15 on earnings management. Table 7 reports the main results. The empirical analysis relies on both the accrual-based earnings management proxy (ABSDA) and real earnings management proxies (REM, ABNCFO, ABNPROD and ABNDISX).

Table 7. Results of regression model estimation

	(1) ABSDA	(2) REM	(3) ABNCFO	(4) ABNPROD	(5) ABNDISX
IFRS 15	0.000 (1.62)	-0.044*** (-4.91)	-0.002*** (-3.18)	-0.038*** (-4.01)	-0.001 (-0.63)
MATERIAL	-0.001 (-1.41)	-0.03 (-0.99)	-0.002 (-1.13)	0.017 (0.61)	-0.014*** (-2.94)
IFRS15*MATERIAL	-0.000 (-0.12)	0.019 (0.88)	0.002 (1.31)	0.020 (0.93)	0.001 (0.23)
FSIZE	0.000*** (4.04)	0.045*** (9.87)	-0.006*** (-23.65)	0.009** (2.03)	-0.022*** (-24.60)
LEV	0.007*** (8.45)	-0.026 (-0.97)	-0.006*** (-2.82)	-0.041 (-1.43)	0.004 (0.83)
ROA	0.000 (-0.24)	0.508*** (13.70)	0.052*** (13.98)	0.620*** (15.34)	0.030*** (4.87)
MBV	-0.000*** (-6.51)	0.005*** (4.09)	0.000*** (2.63)	0.004*** (3.46)	-0.000 (-0.76)
BIG 4	0.000 (0.43)	-0.085*** (-2.69)	0.004*** (2.87)	0.077 (2.87)	-0.004 (-0.74)
Intercept	0.039*** (17.06)	-0.715*** (-8.43)	0.183*** (36.44)	-0.039 (-0.48)	0.527*** (31.01)
INDUS-FE	Included	Included	Included	Included	Included
COUNTRY-FE	Included	Included	Included	Included	Included
YEAR-FE	Included	Included	Included	Included	Included
Wald chi2	2 676.93	1 411.77	2 439.54	1 877.86	1 426.39
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Adjusted R^2	0.46	0.20	0.48	0.21	0.46
N	3,327	2,568	3,327	3,327	2,568

Note. This table reports the baseline results of regression model FGLS estimation. The dependent variable is one of the five earnings management proxies, including ABSDA, ABNCFO, ABNPROD, ABNDISX and REM. IFRS 15 is a time dummy that takes 1 beginning in the financial year in which the IFRS 15 was mandatory adopted. The sample selection process is described in Table 3 and all other variables are defined in Table 2. All continuous independent variables are winsorized at the 1st and 99th percentiles. All specifications include Industry, country and year fixed effects. ***, **, and * denote significant at the 1%, 5%, and 10% levels, respectively.

Column 1 of Table 7 reports the results where the absolute value of discretionary accruals is included as the dependent variable (Specification 1), while columns (2) to (5) present results using the combined and individual real earnings management proxies as dependent variables (Specifications 2 to 5). Across all specifications, the model exhibits significant explanatory power, as indicated by the *Wald Chi2* test, regardless of the proxy used as the dependent variable. Column 1 of Table 7 reveals an insignificant coefficient on the interaction term IFRS15*MATERIAL. This result suggests that firms materially affected by IFRS 15 (the MATERIAL sample) do not

experience a significant change in accrual-based earnings management practices relative to those not materially affected (the NO-MATERIAL sample). Columns (2) to (5) of Table 7 report the results concerning the impact of IFRS 15 mandatory adoption on real earnings management. Regardless of the proxy used as the dependent variable, the coefficient on IFRS15*MATERIAL remains statistically insignificant. These findings indicate that the IFRS 15 mandatory adoption is not associated with a change in real earnings management practices.

Overall, the results suggest that the new revenue recognition standard does not significantly affect the earnings management practices of firms materially affected by IFRS 15 compared to those not materially affected by the standard. Although the implementation of IFRS 15 required considerable effort, it appears that firms did not adjust their earnings management behavior. These findings are consistent with those of Napier and Stadler (2020), who reported that IFRS15 implementation did not lead to significant changes in the accounting numbers for the majority of STOXX Europe 50 firms.

5.3 Robustness checks

To strengthen our findings and mitigate potential bias arising from non-random treatment assignment, we conducted robustness checks using entropy balancing. Table 8 reports the results of the robustness tests. It shows an insignificant coefficient of the interaction term IFRS15*MATERIAL for all specifications which confirm our baseline results.

Table 8. Results of regression model estimation using the entropy balancing technique

	(1) ABSDA	(2) REM	(3) ABNCFO	(4) ABNPROD	(5) ABNDISX
IFRS 15	0.000 (1.59)	-0.038*** (-3.93)	-0.002*** (-3.27)	-0.042*** (-4.30)	-0.002* (-1.73)
MATERIAL	0.000 (0.76)	-0.024 (-1.00)	-0.001 (-0.98)	-0.019 (-0.77)	-0.012*** (-3.97)
IFRS15*MATERIAL	0.000 (0.18)	0.008 (0.40)	0.002 (1.29)	0.017 (0.88)	0.000 (0.29)
FSIZE	0.000*** (4.99)	0.043*** (10.19)	-0.004*** (-18.25)	0.016*** (3.56)	-0.015*** (-20.89)
LEV	0.006*** (7.13)	-0.064** (-2.26)	-0.003* (-1.82)	-0.044 (-1.55)	-0.004 (-0.84)
ROA	-0.000 (-0.15)	0.392*** (9.93)	0.044*** (11.99)	0.544*** (13.56)	0.026*** (5.03)
MBV	-0.000*** (-4.14)	0.004*** (3.09)	0.000*** (3.49)	0.005*** (3.92)	0.000 (0.53)
BIG 4	0.004 (5.77)	-0.126*** (-4.03)	0.001 (0.37)	-0.059* (-1.95)	-0.020*** (-4.42)
Intercept	0.033*** (11.91)	-0.636*** (-7.97)	0.161*** (34.04)	-0.025 (-0.31)	0.429*** (32.90)
INDUS-FE	Included	Included	Included	Included	Included
COUNTRY-FE	Included	Included	Included	Included	Included
YEAR-FE	Included	Included	Included	Included	Included
Wald chi2	2 491.87	1 348.97	2 123.09	1 786.30	1 697.33

	(1) ABSDA	(2) REM	(3) ABNCFO	(4) ABNPROD	(5) ABNDISX
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000
Adjusted R^2	0.54	0.29	0.39	0.32	0.44
N	3,327	2,568	3,327	3,327	2,568

Note. This table reports the results of regression model estimation using the entropy balancing technique. The dependent variable is one of the five earnings management proxies, including ABSDA, ABNCFO, ABNPROD, ABNDISX and REM. IFRS 15 is a time dummy that takes 1 beginning in the financial year in which the IFRS 15 was effectively implemented. The sample selection process is described in Table 3 and all other variables are defined in Table 2. All continuous independent variables are winsorized at the 1st and 99th percentiles. All specifications include Industry, country and year fixed effects. ***, **, and * denote significant at the 1%, 5%, and 10% levels, respectively.

6. Conclusion

This study investigated whether the mandatory adoption of IFRS 15 has affected earnings management practices. Using a sample of 3,327 firm-year observations from companies listed on the STOXX Europe 600 index over the period 2012-2023, we employed a difference-in differences design. The empirical findings which emerge from this study is that the mandatory adoption of IFRS 15 had no significant impact on the level of accrual-based and real earnings management among firms materially affected by IFRS 15, relative to those not materially affected.

These findings should be of particular concern to accounting standard setters and regulators and carry important practical implications. In particular, standards setters and regulators should inquire whether the mandatory adoption of IFRS 15 has achieved its stated objective of enhancing comparability and the quality of financial reporting. The findings of this study do not suggest that IFRS 15 lack relevance; rather, they indicate that other factors may play a more influential role in shaping earnings management behavior. Additionally, the findings are relevant to investors and analysts seeking to understand the impact of the new revenue recognition standard on earning quality.

The results found should be interpreted with caution. Indeed, to test the effect of IFRS 15 mandatory adoption on earnings management, we employed a difference-in-differences design, identifying firms materially affected by the implementation of IFRS15 as the treatment group, and those not materially affected as the control group. Nevertheless, the selection of the control group is not infallible (Doukakis, 2014), and the results may partly reflect the characteristics of the chosen sample. To strengthen our findings and mitigate potential bias arising from non-random treatment assignment, we conducted robustness checks using entropy balancing.

Although the study fails to reject the null hypotheses that mandatory IFRS 15 adoption is not associated with changes in accrual-based and real earnings

management, the standard might affect other attributes of earnings quality, such as predictability and persistence which are beyond the scope of this study. Future research could extend the analysis to provide a more comprehensive understanding of the real effects of the IFRS 15 on the quality of reported earnings. Additionally, a country-level analysis could offer further insights into the impact of IFRS 15 on earnings management practices.

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[i] The FASB issued the ASC606 "Revenue from Contracts with Customers".
[ii] Throughout the paper, we refer interchangeably to IFRS 15 or ASC 606 as the new standard on revenue recognition.
[iii] Cited by Altamuro *et al.* (2005), page 376.
[iv] For more discussion about the earning quality attributes, see Dechow *et al.* (2010).
[v] Lee and Lee (2020) applied the modified Jones model (Dechow *et al.*, 1995) to estimate non-discretionary accruals.
[vi] Following Doukakis (2014), we did not multiply ABNPROD by minus one given that unusually high productions costs indicate overproduction to decrease cost of goods sold.
[vii] The regression model using ABNDISX or REM as dependent variable can only be estimated for 2 568 observations because not all firms separately report selling, general, and administrative expenses to estimate the ABNDISX.
[viii] This approach was also adopted by Doukakis (2014).
[ix] To further support the comparability of the treatment and control groups, we performed robustness checks using entropy balancing (See section 6) to control for observable firm-level characteristics, and we verified that pre-treatment trends in EM proxies were statistically similar between the two groups. These steps help mitigate concerns about selection bias and reinforce the appropriateness of the NO-MATERIAL sample as a control group.
[x] We can cite the example of Fortnox for which annual reports are available in Swedish language.
[xi] As illustrative examples, we can cite ABB Ltd, Adecco and Qiagen, which apply US GAAP, as well as Georg Fischer, Bachem Holding, Swatch Group and Siegried which apply Swiss GAAP.
[xii] For Naturgy Energy, we did not find any reference to IFRS 15 in its annual reports.
[xiii] Our selection process identified three firms that have adopted IFRS 15 voluntarily in 2017, including UCB, Huhtamaki and Hera.
[xiv] Datastream database used the Industry Classification Benchmark (ICB) to classify firms.
[xv] In the prior literature, there is no universally accepted threshold for identifying serious multicollinearity among independent variables. However, a commonly used rule of thumb suggests that the absolute value of the correlation coefficient should not exceed 0.8 according to Gujarati and Porter (2009). In our dataset, the highest observed correlation is 0.554, indicating that all correlations fall well within the acceptable range.