



# Moderating role of voluntary IFRS adoption on earnings management and credit score of private companies

Michele Bertoni <sup>a</sup>, Paolo Candio <sup>b,\*</sup>, Valentino Pediroda <sup>c</sup>

<sup>a</sup> University of Trieste, Dept. of Economics, Management, Mathematics and Statistics, Italy

<sup>b</sup> University of Trento, Dept. of Economics and Management, Trento, Italy

<sup>c</sup> University of Trieste, Dept. of Engineering and Architecture, Italy

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## ABSTRACT

Earnings management practices may be implemented to unduly improve the company's credit score, and in voluntary settings, a company's choice of adopting IFRS can influence the company's credit profile. We conduct an empirical analysis on a representative sample ( $n = 10,389$ ) of Italian private companies and find that earning management practices improve, whereas a voluntary IFRS adoption worsen a company's creditworthiness profile. We also find that IFRS adoption cancels out the former undue credit profile benefits, further penalising the credit score. Future studies should replicate these analyses for other contexts and using alternative financial measures to improve the generalisability of these findings.

## 1. Introduction

Private companies play a pivotal role in national economies and a key to their success is access to finance (Manyika et al., 2021). Similar to the role played by rating agencies for listed companies, specialised agencies issue company credit scores (CSs) that are used as standardised measures of creditworthiness, which financial intermediaries predominantly rely on when allocating capital (European Union, 2024). CSs are typically generated using machine learning algorithms, allowing for the automated analysis of traditional financial metrics and economic behaviours, such as profitability, liquidity, solvency and efficiency, as well as accounting quality and reporting transparency (Yang et al., 2021).

Company managers often have the incentive to manipulate reported earnings (i.e. earnings management (EM); Dechow et al., 2010) to enhance reported financial performance. In creditor-oriented financial contexts, such as Germany, Japan and Italy (International Monetary Fund, 2024), often characterised by 'weak equity' accounting systems (Nobes, 1998), private companies have to essentially rely only on bank loans or debt financing. Consequently, they tend to implement EM practices to improve their CS and lower the cost of debt, which has been documented by a body of literature (Ali and Zhang, 2008; Alissa et al., 2013; Liu et al., 2018). However, this may not be generalisable to private company settings as EM represents an adverse accounting quality signal that is detectable by rating agencies owing to the reversal property of accounting (i.e., over- or under-estimation of earnings that are reversed in future accounting periods; Hill et al., 2018). Based on the aforementioned literature, we propose the following hypothesis.

H1: Earnings management negatively affects credit score in private company settings.

\* Corresponding author at: Dept. of Economics and Management, University of Trento, via Vigilino Inama, 5 – 38122, Trento, Italy.  
E-mail address: [paolo.candio@unitn.it](mailto:paolo.candio@unitn.it) (P. Candio).

Unlike listed companies, which are subject to mandatory regimes (European Union, 2002), company managers of private companies are often provided the option to choose between international and national accounting standards (Beuselinck et al., 2023; European Commission, 2023). However, this choice can impact the disclosed accounting information quality and level of reporting transparency, especially in ‘weak equity’ accounting systems (Hlaciuc et al., 2013) with major differences exist between the two framework options. Consequently, private companies may opt for international standards, which financial intermediaries generally regard as greater in accounting quality (Barth et al., 2008; García et al., 2017) than national accounting frameworks (Jorissen et al., 2022). A prime example is the International Financial Reporting Standards (IFRS), which have been positively associated with several potential benefits, including reduced information asymmetry (Leuz, 2010; Agana et al., 2023). Indeed, for private company settings, voluntary IFRS adoption has been linked to improved financial reporting quality, reduced cost of debt and easier access to debt markets (Bassemir, 2018; Bertrand et al., 2021), although no explicit assessment of that choice on CS has yet been conducted. Therefore, we propose the following hypothesis:

H2: A voluntary IFRS adoption positively influences credit score in private company settings.

Considering the relevance of their implications, managers may adopt EM practices and IFRS, with these two potentially interacting in terms of their effect on CS. Specifically in private company settings, Cameran and Campa (2020) found that adopting IFRS voluntarily leads to lower likelihood of EM and improved reporting quality. However, to date, whether choosing IFRS over national accounting standards would moderate the effect that EM has on CS and further penalise companies adopting this management practice remain unclear. In principle, based on the considerations made for H2, choosing IFRS would improve reporting transparency and enable a better capturing of EM practices by rating agencies. Hence, we posit the following hypothesis:

H3: Voluntary adoption of IFRS negatively affects the association between earnings management and credit score in private company settings.

## 2. Materials and methods

### 2.1. Data and variables

We used a dataset comprising 10,389 Italian private companies from 2017 to 2021. This dataset excluded subsidiaries of publicly traded companies (to prevent the influence of company’s IFRS adoption choice), firms with incomplete data and negative equity and banks and other financial institutions (to preserve cross-comparability within the analysed sample), thus yielding 51,945 company-year observations. Among these companies, 9476 adhered to the Italian national accounting standards, whereas 913 followed IFRS. All companies in our sample were either joint-stock (‘società per azioni’) or limited companies (‘società a responsabilità limitata’), virtually including the entire population of Italian private companies, thus making it a robust representation of the context under study.

Financial statement data were retrieved from modeFinance (a University of Trieste spin-off), imported into spreadsheets and subsequently analysed using STATA 15 software (StataCorp, 2017). We capitalised on a privileged access to CS data provided by modeFinance, an entity officially recognised as a Credit Rating Agency by the European Securities and Markets Authority (2015). Furthermore, modeFinance applies a multi-dimensional and multi-objective algorithm known as Multi Objective Rating Evaluation (MORE) to assign CSs (modeFinance, 2015). The model evaluates insolvency risk by analysing and aggregating indicators of a firm’s financial health (e.g. profitability, liquidity and capital structure) along with country and industry variables. Furthermore, the MORE model categorises risk into several classes reflecting the company’s creditworthiness (Ahelegbey, et al., 2023). MORE’s algorithm was developed blind to the choice of accounting framework.

The response variable was CS, which was measured on an ascending 1–10 scale. The main explanatory variables were IFRS adoption and EM. Moreover, EM was measured in terms of the absolute value of abnormal working capital accruals (AWCAs; ratio–scale variable) scaled by initial total assets (DeFond and Park 2001) and winsorised at the 95 % level to discard outliers, aligning with previous research (Cameran et al., 2014; Cameran and Campa, 2020).

$$AWCA_t = WC_t - \left( \frac{WC_{t-1}}{S_{t-1}} \right) \times S_t,$$

where AWCA denotes abnormal net working capital accruals at time  $t$ .  $WC_t$  denotes the net working capital at time  $t$ .  $WC_{t-1}$  and  $S_{t-1}$  represent net working capital and sales at the end of the previous reporting period, respectively. Finally,  $S_t$  denotes sales at time  $t$ .

The AWCAs is a well-established measure of EM. Although EM may refer to the manipulation of real activities (i.e. real EM; Roychowdhury, 2006), accrual-based EM represents the most relevant metric when studying choice of accounting standards. An interaction term between IFRS and AWCA was used to estimate the moderating effect investigated. Based on the extant literature on the determinants of insolvency risk, the following controls were selected.

- Industry, considering the expected heterogeneity between sectors of activity.
- Company size, measured as the natural logarithm of total assets, influencing financial stability (Mali and Lim, 2016; Zhang, 2018).
- A dummy variable indicating whether the firm’s control is under a non-Italian entity, a condition often associated with the choice to adopt IFRS (Di Fabio, 2018).

- The percentage of intangible and tangible fixed assets in total assets. These measure capital intensity, affecting a private firm’s access to credit (Lim et al., 2020).
- The ratio between operating cash flow and equity, as a proxy for financial performance (Cameran and Campa, 2020; Zhang, 2018).
- The ratio between total debt and total assets, a measure of financial leverage and risk (Kim et al., 2011; Mali and Lim, 2016).
- A dummy variable indicating whether the firm incurred a net loss in the previous year, in line with Mali and Lim (2016).

2.2. Empirical strategy

Sets of linear regression models were estimated to test the three hypotheses. Multivariable analyses were conducted by controlling for the effect of relevant contextual and financial factors to establish the independent effect of the explanatory variables on CS, using the following general equation.

$$Score_{it} = \beta_0 + \beta_1 AWCA_{it} + \beta_2 IFRS_{it} + \beta_3 AWCA_{it} \times IFRS_{it} + \beta_4 contextualcontrols_{it} + \beta_5 financialstructure_{it} + \beta_6 financialperformance_{it} + \varepsilon_{it}$$

where  $\beta_1$ ,  $\beta_2$  and  $\beta_3$  represent the respective estimated independent effects for H1, H2 and H3.

2.3. Statistical analysis

Summary statistics were used to evaluate the sample of companies and their characteristics. Pearson’s pairwise correlations were calculated between the identified variables to examine the direction and strength of the univariate linear relationships. Moreover, a forward stepwise method was used for model specification, with regression models being developed incrementally. Considering the panel structure of the data, a random-effects linear model approach was employed. The initial specification, Specification 1, included only the primary explanatory variables of interest, followed by the incorporated contextual controls (Specification 2). Finally, Specification 3 included financial structure and performance controls. Interaction terms were introduced to evaluate the effect modification. Robust standard errors addressed potential heteroskedasticity in the error terms. Wald tests were conducted to examine differences between categories, with statistical significance determined at the  $p < 0.05$  level.

3. Results

Fig. 1 shows that the CS density distribution of the 10,389 companies analysed slightly shifts towards the centre and right, signifying that a proportion of those entities have improved their CS over time (2017: mean 6.50, SD 1.46; 2021: mean 6.70, SD 1.48). Comparing the group of companies opting for IFRS with those adopting the Italian accounting standards, Fig. 2 illustrates that the former group reports a flatter but comparable density distribution, with the centre values being less prevalent compared to their

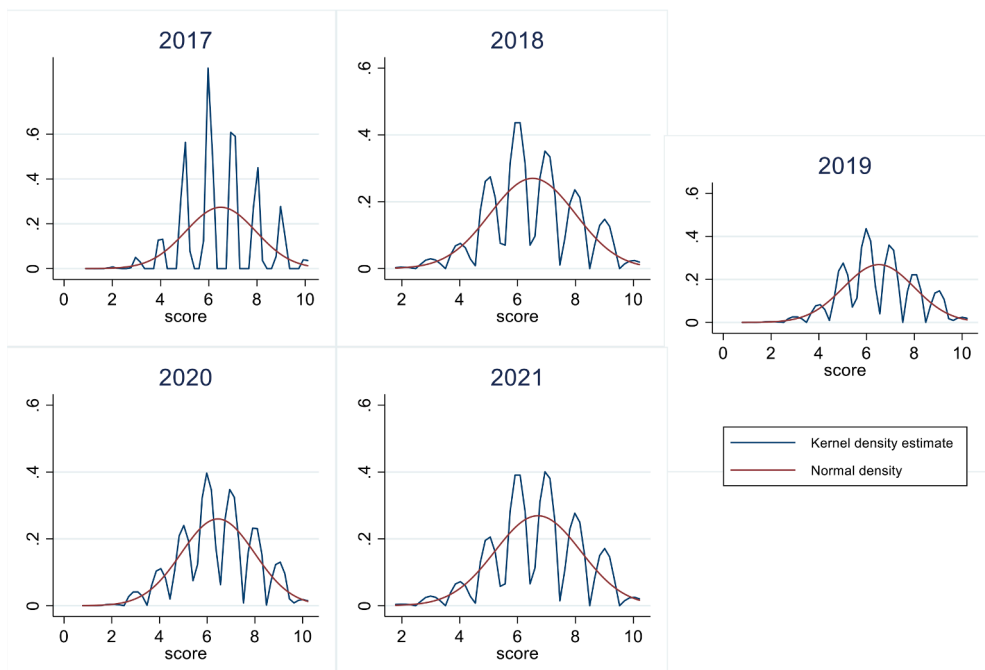


Fig. 1. Density plots of credit score by year.

counterparts, as evidenced by a minimal average difference (IFRS: mean 6.12, SD 1.60 vs. Italian accounting standards: mean 6.58, SD 1.47). This finding implies that companies, over time, improved their insolvency risk profile among the different factors and management practices potentially affecting CS; however, these charts do not explain the role of EM and IFRS.

Voluntary IFRS adoption and EM are negatively associated with CS, signifying that companies that choose to adopt the international standards and manipulate earnings to improve their rating are penalised (Table 1). Contextual factors, financial structure and performance factors are all significantly associated with the response variable. Financial leverage expressed in terms of debt ratio ( $-0.701, <0.001$ ) is negatively associated with CS. Moreover, Table 1 reveals that all the control variables are significantly correlated with EM and that divergent associations exist between choice for the IFRS framework and EM.

### 3.1. Regression analysis

Controlling for other variables, Model 3 underscores that EM predicts higher CS (mean 0.04034, SE 0.01807; Table 2); therefore, hypothesis 1 was rejected. Compared to the general trends within listed company settings (Hill et al., 2018), the specialised rating agency's algorithm could not adequately detect EM. These algorithms are developed blind to accounting standards (modeFinance, 2015), which is especially relevant considering that our sample of companies comprised 91.2 % firms applying national accounting standards that may allow managers to exercise greater discretion in financial reporting, potentially leading to increased opportunities for EM compared to international standards (Pereira and Gaspar Alves, 2017). Thus, the level of EM we calculated would not coincide with that estimated by the algorithm, thereby avoiding the corresponding CS penalisation.

By contrast, adoption of IFRS is negatively and consistently associated with CS (H2) across the three model specifications, although the effect diminishes with increased model complexity. Therefore, *ceteris paribus*, IFRS adoption predicts lower CS by mean 0.12288 (SE 0.03776). Assuming optimal model specification, partially supported by an explained variance of approximately 60 %, one possible explanation for this counterintuitive result is that the main explanatory variable only captured whether a private company opted for IFRS without considering the level of compliance to the international accounting standards (which may be challenging for private companies; Pacter, 2009; Nobes, 2010; Bova and Pereira, 2012) and corresponding change in accounting quality.

Table 2 reveals that IFRS adoption independently and substantially moderates EM's influence on CS (H3, mean  $-0.10800$ , SE 0.05353). Generally, implementing EM practices and IFRS lowers companies' CS, implying that IFRS adoption can mitigate the undue overestimation induced by EM and the issue of inadequate information signal to stakeholders. Higher asset capitalisation (intang\_perc: mean  $-1.84456$ , SE 0.07882; tang\_perc: mean  $-1.51326$ , SE 0.04162) and higher financial leverage, (debratio: mean  $-5.22475$ , SE 0.04097) predict worse CS profiles.

## 4. Discussion and conclusions

This study examines whether choosing IFRS over national accounting standards and performing EM independently influence CS of private companies. We determine that voluntary adoption of IFRS negatively predicts CS, whereas manipulating earnings improves a company's creditworthiness. Notably, we find that when a company opts for IFRS, EM practices no longer lead to CS improvements. This finding implies that the underlying credit scoring algorithm would not be able to detect EM practices—potentially due to a

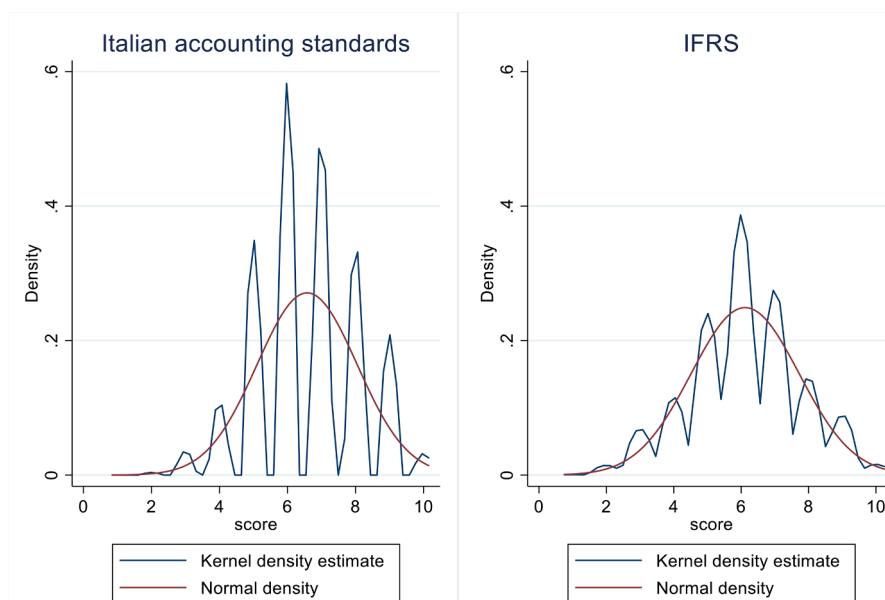


Fig. 2. Density plots of credit score by choice of accounting standard.

**Table 1**  
Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) score	1.000										
(2) IFRS	−0.087* (<0.001)	1.000									
(3) AWCA	−0.057* (<0.001)	−0.006 (0.143)	1.000								
(4) industry	−0.024* (<0.001)	−0.089* (<0.001)	0.019* (<0.001)	1.000							
(5) foreign	0.082* (<0.001)	0.106* (<0.001)	0.011* (0.014)	−0.013* (0.004)	1.000						
(6) ln_tat	−0.017* (<0.001)	0.147* (<0.001)	−0.038* (<0.001)	−0.216* (<0.001)	0.077* (<0.001)	1.000					
(7) intan_perc	−0.079* (<0.001)	0.289* (<0.001)	−0.034* (<0.001)	−0.076* (<0.001)	0.091* (<0.001)	0.179* (<0.001)	1.000				
(8) tang_perc	−0.090* (<0.001)	0.078* (<0.001)	−0.104* (<0.001)	−0.112* (<0.001)	−0.092* (<0.001)	0.216* (<0.001)	−0.107* (<0.001)	1.000			
(9) ocfeq	0.013* (0.004)	0.004 (0.360)	−0.016* (<0.001)	−0.005 (0.267)	−0.004 (0.325)	−0.011* (0.011)	−0.003 (0.467)	0.012* (0.006)	1.000		
(10) debratio	−0.701* (<0.001)	<0.001 (0.912)	0.103* (<0.001)	0.117* (<0.001)	−0.062* (<0.001)	−0.191* (<0.001)	−0.037* (<0.001)	−0.134* (<0.001)	−0.005 (0.243)	1.000	
(11) loss_lag	−0.297* (<0.001)	0.087* (<0.001)	0.023* (<0.001)	−0.017* (<0.001)	0.095* (<0.001)	0.069* (<0.001)	0.122* (<0.001)	0.051* (<0.001)	<0.001 (0.922)	0.112* (<0.001)	1.000

Notes: score: credit score; IFRS: voluntary adoption of IFRS; AWCA: measure of EM; foreign: parent company from outside Italy; ln\_ta: natural logarithm of total asset; tang\_perc: percentage of tangible fixed assets; intang\_perc: percentage of intangible assets; ocf: operating cash flow; oprev: operating revenues; \*  $p < 0.05$ .

**Table 2**  
Regression models.

Variables	Model 1	Model 2	Model 3
H1: AWCA	-0.02064 (0.01979)	-0.03327 (0.02061)	0.04034** (0.01807)
H2: IFRS	-0.45592*** (0.04775)	-0.33035*** (0.05474)	-0.12288*** (0.03776)
H3: IFRS#AWCA	-0.03362 (0.04015)	-0.03015 (0.04175)	-0.10800** (0.05353)
Year		0.04362*** (0.00331)	-0.00461* (0.00269)
Sector		-0.00852*** (0.00137)	0.00169** ( $<0.00179$ )
Foreign		0.30710*** (0.03322)	0.16198*** (0.02061)
ln_tat		-0.01311 (0.01413)	-0.11757*** (0.00835)
intan_perc		-1.71148*** (0.13598)	-1.84456*** (0.07882)
tang_perc		-1.08970*** (0.07189)	-1.51326*** (0.04162)
Ocfreq			$<0.00117$ *** ( $<0.00106$ )
Debratio			-5.24475*** (0.04097)
loss_lag			-0.29834*** (0.01786)
Constant	6.57965*** (0.01357)	6.96297*** (0.15696)	11.52401*** (0.09868)
Observations	51,945	49,349	49,349
Number of id	10,389	10,100	10,100
R-squared	0.81 %	2.86 %	57.4 %

Notes: robust standard errors are in parentheses.

\*\*\*  $p < 0.01$ .

\*\*  $p < 0.05$  and.

\*  $p < 0.1$ .

suboptimal level of implementation of the international accounting standards. However, a worsened information signal induced by IFRS would adversely trigger the algorithm. Hence, IFRS choice would inadvertently mitigate the undue improvements in the company's creditworthiness profile.

Our findings partly align with those of Liu et al. (2018), confirming that companies are able to circumvent CS algorithms and improve their profile. However, partially in contrast to Cameran and Campa (2020), we find that IFRS adoption negatively influences CS in private companies and further penalises them when EM practices are implemented. This finding has real-world relevance and practical implications. Regulatory authorities and specialised credit rating agencies should be cognizant of the non-neutral interaction between IFRS choice and EM, affecting the information signal provided to stakeholders. Furthermore, board of managers should consider this as decision-making is typically distinct between the choice of IFRS and the application of EM.

We used data from a large sample of all private companies in Italy. Despite implementing an empirical strategy safeguarding against any selection bias and heteroskedasticity issues, we could not completely rule out any residual confounding due to omitted variables and endogeneity issues. Nonetheless, we controlled for several relevant factors and used a robust standard error approach to mitigate model misspecification-related risks. Future studies should consider replicating the analysis conducted here for different settings using alternative measures of EM and CS. However, we believe that this study offers valuable preliminary insights, which could serve as a foundation for future research beyond the Italian context. Furthermore, future studies should consider industry-specific heterogeneity issues and the level of IFRS implementation.

## Glossary

IFRS International Financial Reporting Standards

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None.

## Use of generative AI and AI-assisted technologies

The authors declare that no generative AI or AI-assisted technologies were used in the creation of this manuscript.

## CRediT authorship contribution statement

**Michele Bertoni:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Conceptualization. **Paolo Candio:** Writing – review & editing, Writing – original draft, Validation, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Valentino Pediroda:** Writing – review & editing, Writing – original draft, Validation, Resources, Methodology, Data curation.

## Declaration of interests

Michele Bertoni sits on the Board of Directors of modeFinance, holding a non-executive position. Valentino Pediroda sits on the Board of Directors of modeFinance, holding an executive position. The authors of this study declare that they did not receive any benefit or compensation from this research, its results, or its dissemination. This study was conducted purely for academic and scientific purposes, with the aim of advancing knowledge and understanding in the pertinent fields. Any material support received by the authors during this study was solely used to facilitate the research and does not constitute a personal financial gain for any of the authors involved.

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## Data availability

Data will be made available on request.

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