

Modelling the Impact of Earnings Management on the Probability of Financial Statements Fraud

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In the last decades, numerous financial scandals were reported, many related to earnings manipulation and fraud financial reporting. Analytical models were designed and estimation techniques were improved. However, current design of those models suffers from some limitations. The objective of our study is to bring improvements to the analytical models of detection of potential fraudulent financial reporting practices. Therefore, we separately evaluate the impact of real activities earnings management and innate accruals component on the probability of potential fraudulent financial reporting. The empirical analysis is made on a sample of firms with headquarters in G7 countries and the research methodology consists of time series analysis. The results show that, on a long term, the F score is negatively affected by real earnings management activities. Instead, the innate component of accruals seems to reverse over time, having no significant impact in the long run on the probability of fraudulent financial reporting.

Keywords: *Discretionary Accruals; Real Earnings Management; F Score; Altman Score; Panel Cointegration Analysis; Financial Reporting Fraud; Data Envelopment Analysis.*

Introduction

Each business model, no matter its complexity, is subject to an increasing level of uncertainty. The uncertainty can be justified either by the evolution of the economic environment the company operates in or by its management decisions. Unfortunately, the management does not always act in the interest of firms' stakeholders, leading to discretionary decisions in the area of accounting and financial reporting with direct and indirect effects on the profitability, liquidity and risk of the business. The problem researchers have identified is how much managers exceed the boundaries of ethical and legal requirements in their efforts to intensify the effects of moral hazard and adverse selection affecting all stakeholders (Montesdeoca *et al.*, 2019). In a long-term perspective, this problem seems to persist without any corrective actions, especially considering the impact of technological and wealth changes over time, such as the use of crowdfunding as a source of financing. The phenomenon can become even more visible under the circumstances of the recent COVID 19 pandemic and the previous economic crisis. As long as the trust triangle dimensions related to regulation, market-based discipline and cultural dimension are not properly addressed by effective business processes, and the managerial

incentives persist in time, financial reporting fraud will continue to represent a problem for the company (Dupont & Karpoff, 2020).

Various fraud detection solutions have been developed during the last decades. However, the current models of fraud have failed to detect fraudulent firms (Huber & DiGabriele, 2021), especially in case of founder firms (Amiram *et al.*, 2018). Moreover, as noted by Montesdeoca *et al.* (2019), the human factor dimension of fraud has not been incorporated in those fraud detection models, including the analytical ones.

There are studies that show a deterioration of the financial statements' quality in the last decades, especially in term of value relevance of reported earnings (Lev, 2018). Those studies underline the preference managers have for smoothing earnings, along with their interest in using the fair value as a basis for valuation, the last changes in the financial statements design being more oriented to serve the stewardship purpose, rather than the valuation one. As a consequence, those changes in the financial statements value relevance, reduced the ability of the financial ratios to predict bankruptcy (Beaver *et al.*, 2005).

Changes in financial ratios are not produced only by earnings management, because changes in the accounting standards can also significantly impact the financial

statements (Napier & Stadler, 2020), especially in areas like debt contracting and covenants definition (Christensen & Nikolaev, 2018) or managers' investment decision (Schroff, 2017). Additionally, there are shocks in economy which can determine changes in the financial statements' quality, with implications on short-term output of fraud risk assessment analytical models, such as the ones generated by the current COVID pandemic. If accounting errors are unintentional and do not persist in the financial statements in the long-run, accounting irregularities determine a persistent component of innate accruals that affects the models of financial reporting fraud detection (Perols & Lougee, 2011; Amiram *et al.*, 2018; Monahan, 2018). In order to analyze the association between the risk of fraudulent financial reporting and earnings management in the long-run, we proceed to the heterogeneous panel cointegration analysis.

As noted by Dorminey *et al.* (2012), the human factor becomes more important in the definition of fraudulent financial reporting, as managers' ability to find weaknesses of corporate governance mechanisms require competence, while behavioral finance biases provide the possibility of an analysis of subjective managerial discretionary decisions through psychological theories. To our knowledge, no fraud detection model incorporates the dimension of the managerial ability, which could significantly bias the results of the classification model.

In our paper, we try to fill-in the described gaps by analyzing the impact of the discretionary accruals and real earnings management on the probability of fraudulent financial reporting. As noted by Perols & Lougee (2011), earnings quality affects companies' risk of fraud. Considering Zang (2012), who underlines the relation of substitution between real activities manipulation and accrual-based earnings management, we evaluate the marginal effect of each of those two measures of earnings quality on the risk of financial statements fraud. The actual design of fraud detection models incorporates different measures of total accruals, aimed to reflect the association between accounting results and related cash flows, computed on a short-term perspective. Our approach considers proxies for both discretionary accruals and real earnings management, checking the impact of those components on the probability of fraud in financial reporting, in a long-term perspective. To have a better understanding on the marginal effect of those measures of accruals, we control the results of firms' financial characteristics, business model complexity and industry fixed effects.

Additionally, we look for an association between fraudulent financial reporting score and bankruptcy. Altman model score, as financial insolvency determines an additional pressure on managers to commit fraud (Xu *et al.*, 2020).

Our study also addresses the issues of fraud triangle design, which does not incorporate the impact of human factor. Therefore, we look for marginal impact on probability of financial reporting fraud of the managerial ability, similar to Demerjian *et al.* (2012), partially testing the design of the pentagon fraud theory (Dorminey *et al.*, 2012).

This paper studies the relationship between earnings management and the probability of fraudulent financial reporting. First, we establish the hypothesis of the research. Second, using econometrical analysis we estimate the

amplitude of fraud and consider the F score - the dependent variable.

The results show an overall significant impact of earnings management accruals on companies' risk of financial statement fraud. However, the effect of real earnings management is significantly moderated by the country's institutional framework effectiveness, while the effect of discretionary accruals is significantly moderated by the perceived quality of accounting and auditing standards. Instead, none of the estimated models show any significant impact of managerial ability on the risk of financial statements fraud.

The paper provides several insights to the existing body of literature on the topic. The objective of the paper is to bring improvements to the analytical models of detection of potential fraud practice in financial reporting. First, the design of our article makes a clear separation of the marginal effect of each component of the earnings management adjustments on the risk of fraudulent financial reporting, respectively the innate (discretionary) accruals components and the component determined by real activities earnings management strategies. Second, we address the relevance of management experience and expertise to the risk of fraudulent financial reporting. Nonetheless, we assess the relationship between the risk of fraudulent financial reporting and the risk of bankruptcy. We consider that investors' precaution is higher and the risk of fraudulent financial reporting is expected to be lower. With this empirical analysis design, we align to the more recent theories in the area of fraud, such as the pentagon fraud. This type of fraud involves the control for economic and institutional framework configuration, but also for human factor decision making implications. Nonetheless, we emphasize how important the premises of strong country enforcement and regulation framework are.

This paper is structured as follows: the introduction part, followed by the literature review and the hypothesis development, testing the relationship between firms' risk of fraudulent financial reporting and earnings management. The next section presents the research methodology, followed by the analysis of the obtained results. In the last section, the main findings are summarized and conclusions presented, along with future research directions.

Literature Review and Hypothesis Development

The attention paid by researchers to the accounting fraud issues has increased along the last decade, especially after the global financial crisis from 2008, with focus on improving fraud detection techniques, developing models of fraud risk assessment in audit processes, forensic accounting or implications of corporate governance and executives' compensation on fraud detection (Albizri *et al.*, 2019). Many studies were designed around an evolving theory of fraud, which placed the fraud triangle in the center of research, defined by opportunity, financial pressure and the rationalization dimension (Dorminey *et al.*, 2012). Additional to these dimensions, as emphasized by the fraud diamond theory, management capability to override internal controls is also considered (Montesdeoca *et al.*, 2019).

Various fraud detection solutions have been developed in the last decades. However, most studies focused on the triangle of fraud perspective (Dorminey *et al.*, 2012; Montesdeoca *et al.*, 2019), omitting the behavioral component of fraud and the advances in technology, such as block-chain. Those more recent dimensions of fraud can deter the trust triangle compensating controls established by regulation, market-based discipline and the cultural dimension, involving an increasing role of the human factor (Amiram *et al.*, 2018; Huber & DiGabriele, 2021). Therefore, Dorminey *et al.* (2012) emphasize the increasing role of integrity, the fraudsters' power in the organization, the importance of collusion in fraud and the role of human factor intentionally looking to override internal controls and corporate governance mechanism to commit fraud.

Schrand & Zechman (2012) show that about 25 % of overstated earnings are made with intention, while the rest represents cases of financial reporting misstatements made unintentionally, rather related to the bias of optimism between managers. Instead, the authors emphasize, similarly to Perols & Lougee (2011), that a systematic earnings restatement led in time to higher probability of intentional misstatement. Moreover, the unintentional overstatement of earnings reported may be explained by a higher aversion to risk, which can lead to the need of later restatement of financial statements (Christensen *et al.*, 2018).

Mutschmann *et al.* (2021) show that the intentional nature of the decision of earnings management is dependent on the managers' negative psychological profile, referring to Machiavellianism, narcissism or even psychopathy. Unfortunately, the authors also point out that managers with such a profile generate effects for the businesses that cannot be deterred by any internal corporate governance mechanisms. Therefore, we consider our first hypothesis:

H₁: Managerial ability determines significant impact on firms' probability of financial reporting fraud

As noted by Perols & Lougee (2011), the discussion around the probability of financial statements fraud concentrates on the influence of reported accruals. This approach was later confirmed by Chu *et al.* (2019), who showed that management manipulate earnings to beat analysts' targets and keep a reputation of sustainable firm on investors' perception, with direct incremental benefits to CEO equity incentives, no matter the CEO overconfidence. However, Perols & Lougee (2011) noted that the abnormal discretionary expenses, mainly related to sales, general and administrative expenses, have a significant marginal effect on the probability to commit fraud on financial reporting.

Hasnan *et al.* (2013) brought into attention aspects related to the relevance of earnings management on higher fraudulent financial reporting in the previous years, historical data on prior violations, business model complexity and the probability that founders are part of the board of directors. Additionally, Lara *et al.* (2009) draw attention that companies reporting deteriorating performance face a higher pressure in favor of earnings manipulation. The authors show that managers use all possibilities to manipulate earnings through accruals and, if they are exhausted, they appeal to real earnings management

in order to conceal the poor performance in the years preceding the failure.

Using a sample of US companies, Lenard *et al.* (2013) confirmed that discretionary accruals are useful for detecting fraudulent financial reporting of firms, analyzing the effectiveness of the internal control system at the same time. Their results show that discretionary accruals could be a relevant proxy for auditors to identify the firms where their management decided to override the internal control system in order to commit fraud in opposition to those that choose not to in spite of the opportunity of a weak internal control system.

Jones *et al.* (2008) provide relevant results in two directions. First, they confirm a significant association between the probability of fraud on financial reporting occurrence and different measures determined based on traditional accrual econometric models - this includes those that provide performance-matched discretionary accruals; the ones that refer to accruals estimation errors determined by matching them with operating cash-flows and industry effects are also considered. Second, the authors show that the magnitude of fraud schemes during financial statements elaboration is significantly influenced by the level of discretionary accruals compared to the proxy of total accruals which determines a lower marginal effect on the probability of fraudulent financial reporting.

However, Ines (2017) underlines how important the quality of local GAAP is, indirectly leading to higher quality of accruals reported and lower probability of fraudulent financial reporting. The study shows that strategies and policies of aggressive accounting (positive discretionary accruals) are more likely to lead to fraud when preparing financial statements, compared to a more conservative accounting (negative discretionary accruals).

Dechow *et al.* (2011) show that the accuracy of classifying the companies by the restatements of financial reporting is influenced by the deterioration of the financial and non-financial ways of measuring performance rather than by the earnings quality. In this situation, the off-sheet balance items generated by real earnings management managers' decisions bring significant contribution to the definition of an econometric model profiling of potential financial reporting fraudsters. Therefore, we consider our second hypothesis:

H₂: Earnings management determines a significant impact on firms' probability of financial reporting fraud

Measures against fraud implemented at company level are not sufficient. As noted by Ugrin *et al.* (2013), managers' attitude towards financial reporting fraud likely depends on the deterrent effects of enforcement regulation, related to threats of incarceration, fines and professional censure, with a lower perception of the risk of imprisonment. Unfortunately, the level of penalties imposed for fraud committed is not properly calibrated to the economic reality. However, sanctions prescribed by market-based penalties (Karpoff *et al.*, 2008) or the industry-based penalties (Alawdhi *et al.*, 2020) are significantly lower than national regulation, involving extremely high reputation costs for the firms committing fraud.

Current fraud detection models do not yet provide sufficiently accurate results (Beneish & Vorst, 2021; Huber & DiGabriele, 2021), as they are dependent on the materiality of the misrepresentation in the financial statements (Hong, 2020), leading to an increase of the risk of non-detection of fraudulent financial reporting practice for long periods. The persistence of accruals is essential to be incorporated in the fraud detection models, as the probability of risk of fraudulent financial reporting is more related to the systematic managers' predisposition to manipulate financial statements, rather than the level of aggressive accounting (Perols & Lougee, 2011; Beneish *et al.*, 2012). As long as earnings quality is highly dependent on accounting regulation framework, there are implications on the risk of financial statements fraud related to accounting and auditing regulation framework.

The premises for earnings management are conditioned by executives' compensations, which reflect the pressure component of the fraud triangle. However, the pressure the managers exercise along the entire financial reporting

supply chain organization hierarchy to commit financial reporting fraud is conditioned by the effectiveness of the corporate governance mechanisms, such as the efficiency of the internal control systems design and its operating effectiveness or the implemented model of risk assessment (Amiram *et al.*, 2018).

Methodology Research

The methodology used in our study supports several levels of analysis. Mainly, the analysis consists of exploratory statistical analysis and panel data OLS regression estimation. To review consistency of our results, we also proceed to a quantile regression analysis to control any possible bias determined by F score distribution of probabilities. Further, to highlight the dynamic of the relationship between firms' risk of fraudulent financial reporting and earnings management practice, we use a time series analysis as well. Overall, the steps of our empirical analysis are described in Figure 1.

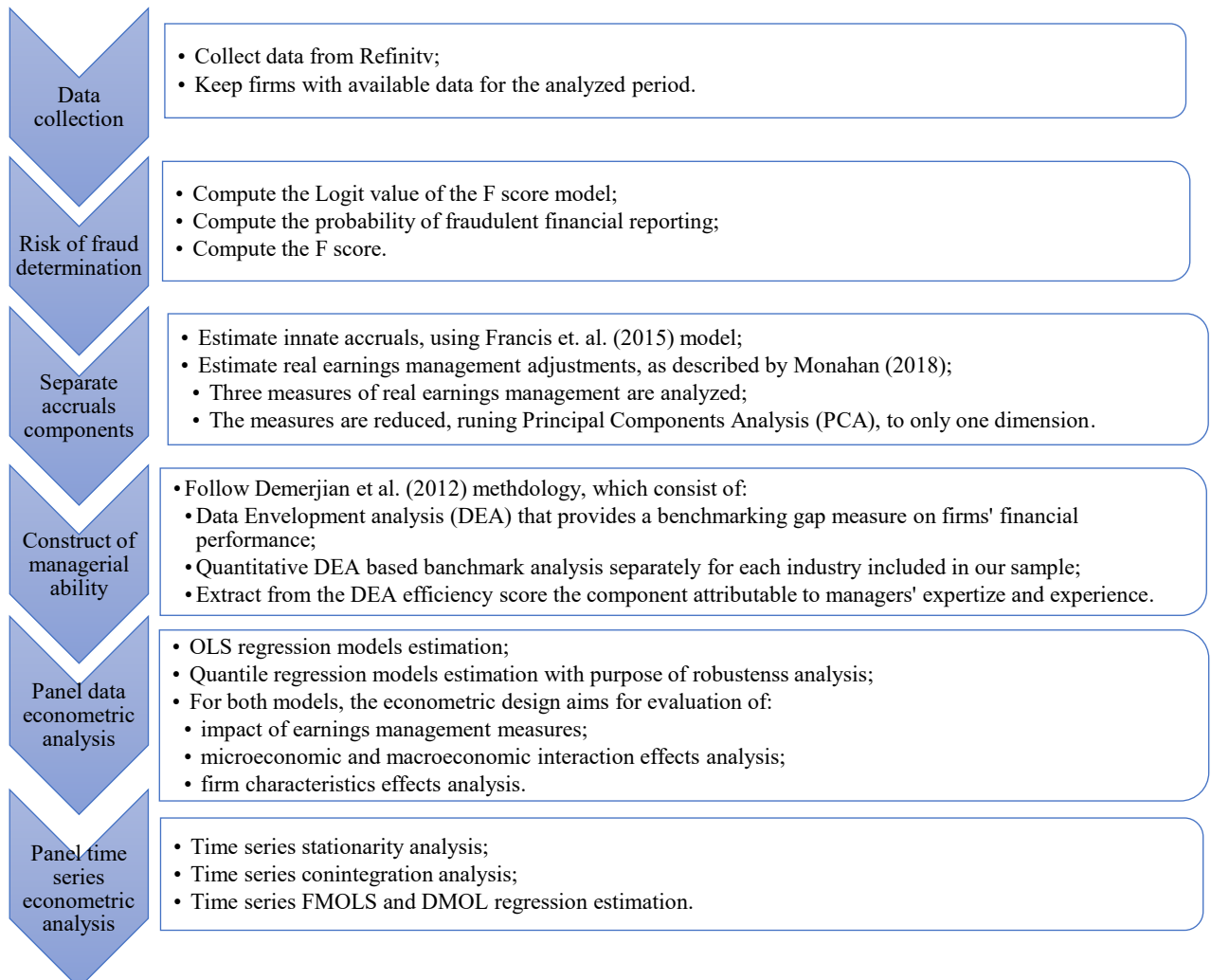


Figure 1. Steps of Methodology Research

Data Collection and Variables Definition

Our study analyzes data disclosed in the annual financial statements. The period analyzed was 2014–2020, choice made to avoid the risk of our results being affected by the global financial crisis effects. Reasoning behind this limitation has several considerations. First, reviewing the evolution of the DJIA (Dow Jones Industrial Average), we can observe that the peak reached in August 2007 was achieved only on March 2013. Second, we note that the study of Kannan et al. (2019) determined that economies’ recovery caused by financial crises are longer than any other type of crisis, highlighting even an average period of recovery of approximately six years. Additionally, authors remind as well that this crisis was also amplified by the strong financial integration of the capital markets. Similar conclusions are drawn-up by international financial organizations, such as IMF or the World Bank, underlining that the V curve describing countries recovery from the financial crisis was deeper than expected (Chen et al., 2019; Kose et al., 2020).

The data used is extracted from Refinitiv database, but limited to the most developed countries, represented by the G7 group, respectively Canada, France, Germany, Italy,

Japan, Russia, the United Kingdom and the United States of America. The choice for those countries was mainly driven by the economic power those states have and their essential role in global and regional standard-setting professional organisations, addressing regulations in the area of financial reporting, fraud and auditing. Additionally, we consider those countries as a benchmark that emphasises overall the most recent trends in terms of leaders formation and leaders’ influence on global and regional best practice. Nonetheless, these countries are generally known as role models in the area of enforcement solutions, which are essential mechanisms and tools ensuring compliance with regulation and reduction of risk of fraudulent financial reporting, especially because they are mainly the countries reporting the major hystorical instances of fraudulent financial reporting (Hail et al., 2018).

As we plan to perform time series statistical testing, we resumed our database to only 1,355 firms for which we have available data. Therefore, we processed a database summing up 9,485 observations.

In Table 1 we provide a summary of the description of the variables used in our study.

Table 1

Variable Description, Source: Authors’ Projection

Variable	Name	Description	Source of data
F score	F score	Score calculated based on financial information disclosed by financial statements, as per Dechow et al. (2011) model	authors’ calculation
Discretionary accruals	DA	Proxy of discretionary accruals, calculated based on balance-sheet information, as the residual of the econometric model proposed by Francis et al. (2005)	authors’ calculation
Real earnings management	RE	Proxy for real earnings management, calculated based on balance-sheet information, as the residual of the econometric model described by Srivastava et al. (2019)	authors’ calculation
Bankruptcy score	BS	Financial distress score, calculated as per Altman model	Refinitiv database
Total assets	Size	Logarithm of firm’s total assets	Refinitiv database
Capital market performance	PER	Traditional price earnings ratio	Refinitiv database
Financing structure	Leverage	Ratio of debt in total equity	Refinitiv database
Rate of return	ROA	Rate of profitability on assets used in operations	Refinitiv database
Audit fee	Fee	Value of audit fee related to the financial exercise	Refinitiv database
Compensation score	CS	Construct calculated to assess quality of firm’s compensation policy, used as proxy for the management incentive factor in our study	Refinitiv database

In Figure 2 we provide our sample composition, by different criteria of grouping data. Overall, we observe that our sample is dominated by firms with main operations in the United States of America and the United Kingdom, operating mainly in IT (24.6 %), commerce (17.29 %),

healthcare (16.08 %) and real estate (14.12 %). The area of operations selected for our study is considered to be the most impacted by the recent COVID 19 pandemics, as per Apedo-Amah et. al. (2020) study.

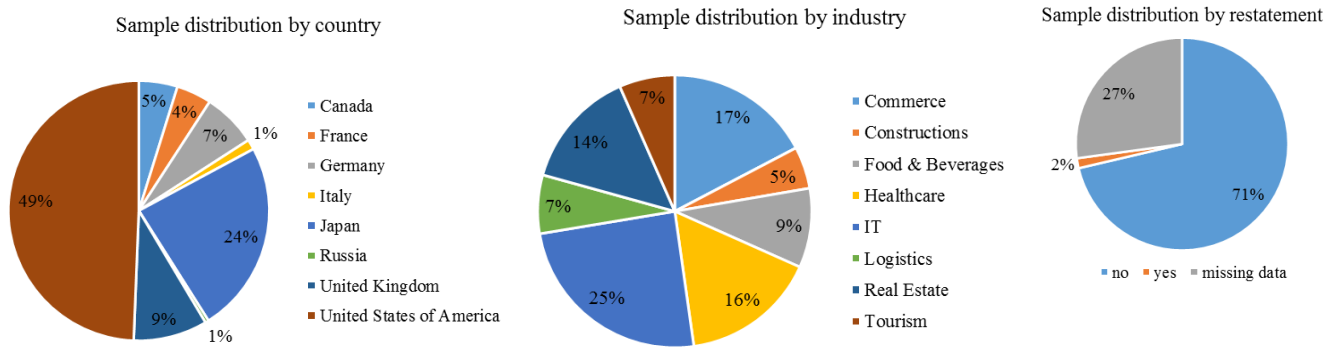


Figure 2. Sample Distribution, Source: Authors' Projection

Risk of Fraudulent Financial Reporting

The econometric models estimate the amplitude of fraud and significant drivers selected to test our two research hypotheses. For this purpose, the dependent variable is the F score, as designed by Dechow et. al. (2011). The estimation of the probability of financial statements fraud is determined by the relation $ob = \frac{e^{logit}}{1+e^{logit}}$. The F score is calculated using the relation $score = \frac{Prob}{0,0037}$, where the score logit is determined considering the following expression.

$$\begin{aligned} Logit = & -7,893 + 0,790 \cdot RSST + 2.518 \cdot \Delta AR \\ & + 1,191 \cdot \Delta Inv + 1,979 \cdot \%SFT \\ & + 0,171 \Delta Cash Sales - 0,932 \cdot \Delta ROA \\ & + 1,029 \cdot Issue. \end{aligned}$$

We use the following notations: *RSST* – balance sheet based total accruals, ΔAR – changes in account receivables, ΔInv – changes in inventory, $\%SFT$ – working capital assets, $\Delta Cash Sales$ – changes in sales without changes in accounts receivables, ΔROA – changes in return of assets, *Issue* – dummy variables (1 if the company issued long-term debt or common stock in year *t*, 0 otherwise). All financial variables are deflated by the average firms' total assets $0.5 \cdot (Total\ assets_t + Total\ assets_{t-1})$. The accruals variable is given by the relation presented below.

This measure does not describe the level of discretionary accruals, as it cumulates not only changes in working capital, but also changes in the non-operating activities, becoming less relevant in reflecting the persistent component of the total accruals, respectively the innate accruals.

$$\begin{aligned} RSST = & [(Total\ assets_t - Cash\ equivalents_t \\ & - Investments_t + Investments\ in\ Equity_t \\ & - Total\ liabilities_t - Preferred\ Stock_t) \\ & - (Total\ assets_{t-1} - Cash\ equivalents_{t-1} \\ & - Investments_{t-1} + Investments\ in\ Equity_{t-1} \\ & - Total\ liabilities_{t-1} - Preferred\ Stock_{t-1})] \\ & / [0.5 (Total\ assets_t Total\ assets_{t-1})] \end{aligned}$$

Measures of Earnings Management

The study is designed to address the problem of value relevance of discretionary accruals and real earnings management adjustments in the probability of financial statements fraud, as the current model of Dechow et al. (2011) incorporates only a static image of the total accounting-based accruals on the F score model. In spite of

the controversies that total accruals are more relevant for bankruptcy prediction or financial statements fraud detection (Bayley et al., 2007), we follow Jones et. al. (2008), Perols & Lougee (2011) or Nikolaev's (2014) approaches that look for the value relevance of discretionary accruals on a wider period than two consecutive exercises, as per Francis et al. (2005) definition. The econometric model used to calculate discretionary accruals is described in the relations below:

$$\begin{aligned} TCA_{j,t} = & \alpha_0 + \alpha_1 \cdot CFO_{j,t-1} + \alpha_2 \cdot CFO_{j,t} \\ & + \alpha_3 \cdot CFO_{j,t+1} + \alpha_4 \cdot \Delta Rev_{j,t-1} \\ & + \alpha_5 \cdot PPE_{j,t} + \varepsilon_{j,t} \end{aligned}$$

where

$TCA_{j,t} = \Delta CA_{j,t} - \Delta CL_{j,t} - \Delta Cash_{j,t} + \Delta StDebt_{j,t} - DEPN_{j,t}$ - represent the proxy for total accruals in year *t*, $CFO_{j,t} = NIBE_{j,t} - TCA_{j,t}$ describe the firm's cash flow from the operations in year *t*, $NIBE_{j,t}$ – net income before extraordinary items in year *t*, $\Delta CA_{j,t}$ – changes in current assets, $\Delta CL_{j,t}$ – changes in cash, $\Delta StDebt_{j,t}$ – changes of financial debts in current liabilities, $DEPN_{j,t}$ – depreciation and amortization expense, $\Delta Rev_{j,t}$ – changes in revenue, $PPE_{j,t}$ – gross value of plant, production and equipment reported.

$$\begin{aligned} AQ_{j,t} = & \beta_0 + \beta_1 \cdot Size_t + \beta_2 \cdot \sigma(CFO)_t \\ & + \beta_3 \cdot \sigma(Rev)_t + \beta_4 \cdot \log(OperCycle_t) \\ & + \beta_5 \cdot NegEarn_t + v_t \end{aligned}$$

where $AQ_{j,t}$ - represents the proxy for discretionary accruals in year *t*, $Size_t$ describes the logarithm of the firm's total assets in year *t*, $\sigma(CFO)_t$ – the standard deviation of the firm's operational accruals, $\sigma(Rev)_t$ – the standard deviation of the firm's revenue, $OperCycle_t$ – the firm's operating cycle, $NegEarn_t$ – the incidence of negative earnings over the past 5 years. Therefore, the residual \hat{v}_t represents the measure for discretionary accruals, as it is not explained by the main business model parameters, respectively the firm's production capacity, the potential of growth, the speed of cash conversion or the incidence of negative earnings.

A separate discussion between real activity-based earnings management and accounting-based discretionary accruals should be made as the effect on business model sustainability and related risk of fraud differs from the

temporal perspective. As noted by Perols & Lougee (2011), accounting accruals are expected to be reverted in time. Real earnings management leads to permanent economic consequences for firms looking carefully for solutions under the boundaries of local GAAP requirements, industry or macroeconomic conditions (Dichev *et al.*, 2016). Under those circumstances, we also consider relevant the effects of real earnings management on the risk of fraudulent financial reporting, especially related to the changes in the firms' cost structure or the intangibles' weight on the balance sheet.

For this purpose, we estimate econometric models, following Srivastava (2019) design presented in the relations below, incorporating the impact of lagged *Rev* variables, in order to reflect the discretionary component of overhead production costs, discretionary costs and respectively abnormal operating accruals, as recommended by Monahan (2018):

➤ Overhead:

$$COGS_{j,t} = \alpha_0 + \alpha_1 \cdot \frac{1}{TA_{t-1}} + \alpha_2 \cdot \frac{Rev_{i,t}}{TA_{t-1}} + \alpha_3 \cdot \frac{\Delta Rev_{j,t}}{TA_{t-1}} + \alpha_3 \cdot \frac{\Delta Rev_{j,t-1}}{TA_{t-1}} + \varepsilon_{j,t}$$

➤ Curtailment of discretionary costs:

$$SG\&A_{j,t} = \alpha_0 + \alpha_1 \cdot \frac{1}{TA_{t-1}} + \alpha_2 \cdot \frac{Rev_{i,t}}{TA_{t-1}} + \alpha_3 \cdot \frac{\Delta Rev_{j,t}}{TA_{t-1}} + \varepsilon_{j,t}$$

➤ Abnormal operating accruals:

$$CFO_{j,t} = \alpha_0 + \alpha_1 \cdot \frac{1}{TA_{t-1}} + \alpha_2 \cdot \frac{Rev_{i,t}}{TA_{t-1}} + \alpha_3 \cdot \frac{\Delta Rev_{j,t}}{TA_{t-1}} + \varepsilon_{j,t}$$

The three variables are reduced to one dimension using the PCA method, which gives the proxy of real earnings management. This way, this dimension incorporates information related to all versions of real earnings management accruals models.

The Construct of Managerial Ability

The measure of managerial ability is estimated using an adjusted form of the DEA (data envelopment analysis) model designed by Demerjian *et al.* (2012). This measure is relevant to check if management competency to override internal controls and external audit filters for earnings quality is relevant for modelling the risk of financial reporting fraud, as indicated by the fraud pentagon (Drominey *et al.*, 2012).

We assess management competence, compared to the top performers in terms of financial performance, reason why we have chosen an output oriented VRS (variables return to scale) envelopment model. The VRS model controls the ability of the companies to operate at different scales, ensuring that each one is benchmarked only with firms of similar size. The DEA analysis is performed at each industry level, to control the specific of operations.

$$\begin{aligned} & \max \sum_{i=1}^m v_i \cdot x_{ij} + v_0^+ - v_0^- \\ & \sum_{j=1}^n \lambda_j \cdot x_{ij} - v_0^- = x_{ij_0}, \forall i \\ & \sum_{j=1}^n \lambda_j \cdot y_{rj} + v_0^+ = y_{rj_0}, \forall r \\ & \sum_{j=1}^n \lambda_j = 1 \\ & \lambda_j \geq 0, \forall j, \emptyset \text{ free} \end{aligned}$$

We consider firms as DMUs (decision making units), in a sample of $j = 1, \dots, n$, counting for $i = 1, \dots, m$ inputs (x_{ij}) and producing $r = 1, \dots, s$ outputs (y_{rj}). The DEA model provide a technical efficiency solution of firm j_0 compared with n peer group firms inputs and outputs. The mathematical model below provides the DEA efficiency measure (Lofti *et al.*, 2020), where λ_j are related positive weights, while the efficiency ratio function is designed to maximize the firm's revenue, considering a specific firm's cost model, equipment, financing policy and research and development potential. The objective of this optimization mathematical program is provided below:

$$\max \frac{\text{Sales}}{v_1 \cdot CoGS + v_2 \cdot SG\&A + v_3 \cdot PPE + v_4 \cdot OpsLease + v_5 \cdot R\&D + Intangibles}$$

The measure of managerial ability is attributable both to the firm and the manager, reason why we have to isolate the effect generated only by management, by controlling the results of DEA efficiency measure for the firms' financial resources, respectively firm size, market share, positive free cash flow, age, business model complexity (business segment concentration) and effect of foreign currency on financial performance (Demerjian *et al.*, 2012). Slacks calculated from the mathematical optimization program are used as dependent variables to estimate the econometric model below. The residual of the model (v_0^+, v_0^-) represents the construct of firm efficiency, defined as portion of a firm gap to reach top rated firm's revenue which is not explained by the constrained financial (cost structure, leases), technical and technological resources (PPE, R&D, intangibles).

$$\begin{aligned} Firm\ efficiency_i &= \beta_0 + \beta_1 \cdot \ln TA_i + \beta_2 \cdot MS_i \\ &+ \beta_3 \cdot FCF_i + \beta_3 \cdot \ln Age_i \\ &+ \beta_3 \cdot FCI_i + \beta_3 \cdot FCI_i \\ &+ Year_i + \varepsilon_i \end{aligned}$$

The final measure of managerial ability is represented by the residuals of this econometric model, after year fixed effects are excluded, as those effects are rather perceived as systematic, generated by macroeconomic root causes.

Considering Demerjian (2018), in order to increase the quality of our accruals proxies we estimate econometric models for each industry included in the study, for both the accruals and managerial ability proxies. This is the reason why we have not focused only on one area of activity, but several ones significantly affected by the current COVID 19 pandemic.

Panel Data Regression Analysis

In the case of OLS regression estimates we also control our results for firms fixed effects, considering the caveats of our discretionary accruals measure, as the business model has a significant impact on its reliability, beyond the impact of the industry fixed effects (Yoon *et al.*, 2020). Additionally, we control our results for robustness against traditional firms' financial performance measures, such as size, leverage, price earnings ratio and ROA.

$$\begin{aligned}
 F\ score_{j,t} = & \alpha_0 + \alpha_1 \cdot DA_{j,t} + \alpha_2 \cdot RE_{j,t} \\
 & + \alpha_3 \cdot BS_{j,t} + \alpha_4 \cdot MA_{j,t} \\
 & + \sum_{i=1}^4 \alpha_{4+i} \cdot Interaction\ effects_{j,t} \\
 & + \sum_{i=1}^6 \alpha_{4+i} \cdot Control\ variables_{j,t} \\
 & + Firm\ fixed\ effects + \varepsilon_{it}
 \end{aligned}$$

To review if the F score model proposed by Dechow *et al.* (2011) significantly incorporates information about discretionary accruals, real earnings management adjustments or management competence, we estimate the OLS linear regression above, where $DA_{j,t}$ – firm j 's discretionary accruals, $RE_{j,t}$ – firm j 's real earnings management adjustments, $BS_{j,t}$ – firm j 's Altman bankruptcy score, $MA_{j,t}$ – measure of managerial ability, ranged between 0 and 1. The model controls the results for the impact of the firms' characteristics, such as size, price earnings ratio, financial leverage, return on assets, compensation score and audit fee. The models look for interaction effects as well, measuring the moderating effect of macroeconomic variables on the firm's risk of financial statements fraud. The marginal impact of discretionary accruals is reassessed with interaction correction, controlling for the amplifying effect of the country economic policy uncertainty (*EPU*) and of the quality of the national accounting and auditing standards (*SARS*). We expect high quality accounting and auditing standards to lead to lower discretionary accruals, while high economic policy uncertainty to determine higher discretionary accruals with indirect implications on the company's risk of financial statements fraud. Additionally, we check the moderating effect of restatement of financial statements (*Restatement*) at the level of discretionary accruals, to assess the impact on the firm's risk of financial statements fraud.

Robustness Analysis

Quantile Regression Analysis

As the F score does not follow a normal distribution, we check our results for robustness by estimating quantile regression, as an alternative to models initially estimated. Following Green (2019), we estimate the quantile regression as well, to control for potential effects of the dependent variables' distribution on the bias of estimations obtained using the OLS regression method.

Time Series Analysis

Based on Perols & Lougee (2011) or Monahan (2018) suggestions, we have looked for a dynamic econometric

approach as well, to capture the effect of accruals persistence on the risk of financial reporting fraud, performing a panel heterogeneous cointegration analysis.

In order to test for a pattern of firms' predilection to manage earnings, especially in case of bankrupt firms or firms managing earnings through activity-based strategies, we control the robustness of our results for interaction effects related to the restatement of financial statements, the quality of accounting standards and the effectiveness of national enforcement mechanisms. The countries' economic policy uncertainty level is also considered.

Panel stationarity testing. Testing for stationarity of time series is performed running a set of panel unit root tests, respectively: Levin-Lin-Chu t test, Im-Pesaran-Shin test, ADF - Fisher Chi-square test and PP - Fisher Chi-square test. All the methods have a similar principle behind. For instance, in the case of the Levin-Lin-Chu test, the assumption that all countries in the panel share the same autoregressive coefficient $\alpha_i = \rho - 1$ is tested, according to the estimating model presented below:

$$\begin{aligned}
 \Delta F\ score_{i,t} = & \alpha \cdot y_{i,t-1} + \sum_{j=1}^{p_i} \beta_{ij} \cdot \Delta F\ score_{i,t-j} \\
 & + X'_{i,t} \cdot \delta + \mu_i + \theta_t + e_{it}
 \end{aligned}$$

where Δ is the first difference operator, p_i is the number of lags, μ_i is the unit-specific fixed effect, θ_t denotes the time fixed effect and e_{it} is the error term that follows a stationary invertible autoregressive moving-average process for each unit in the panel, being independently distributed across the panels. If $\rho < 1$, the test confirms that the time series is stationary. Otherwise, the null hypothesis $\rho = 1$ is accepted, showing that each panel has a unit root.

However, in the case of panel data time series, the short period included (r) and the high cross-section panels (n), are not all the time relevant from the statistical test power point of view (Green, 2020). This determines us to proceed to a long-run analysis, no matter the results of time series order of integration. Overall, this step of the analysis is just a final step of the robustness analysis of our results. Once the level of cointegration is established, we estimate the long run cointegration coefficients using the panel fully modified ordinary least squares (FMOLS) and the panel dynamic ordinary least squares (DOLS) methods:

➤ panel FMOLS model:

$$F\ score_{i,t} = \alpha_i + \delta_{it} \cdot t + \beta \cdot x_{i,t} + \mu_{i,t}$$

where δ_{it} is the coefficient related to year fixed-effects, $F\ score_{i,t}$ is the $I(1)$ Dechow *et al.* (2011) F score, β is the vector of parameters, α_i are intercepts, while $\mu_{i,t}$ are the stationary disturbance terms and $x_{i,t}$ are assumed to be 4×1 vector of independent variables, which follows an AR(1) autoregressive process $x_{i,t} = x_{i,t-1} + \varepsilon_{i,t}$. Using FMOLS instead of OLS, we avoid biased estimates, as the new $\hat{\beta}_{FMOLS}$ is corrected with an endogeneity correction on $F\ score_{i,t}$, leading to a n panel coefficient $\hat{\beta}_{FMOLS} = \frac{\sum_{i=1}^n (\sum_{t=1}^T (x_{it} - \bar{x}_i) \cdot F\ score_{i,t} - T \cdot \hat{\Delta}_{Eu})}{\sum_{i=1}^n \sum_{t=1}^T (x_{it} - \bar{x}_i) \cdot (x_{it} - \bar{x}_i)'}$.

➤ panel DMOLS model:

$$F\ score_{i,t} = \alpha_i + \beta_i \cdot x_{i,t} + \sum_{j=-q}^r \delta_{it} \cdot \Delta x_{i,t-j} + \varepsilon_{i,t}$$

equation which is estimated for each cross-section of the panel, the cointegration coefficient for the overall panel being calculated as the average of the DOLS coefficients for each section.

Results and Discussions

Descriptive Statistics

In Table 2 we provide descriptive statistics for the variables included in the estimated models. Overall, we observe that the F score proposed by Dechow et al. (2011) records a low mean of 0.361 and even a low value of 0.466 for the 75th percentile, which shows an insignificant risk of financial statements misstatement.

The independent variables seem to be heterogeneous, looking at their high standard deviation compared to their mean. However, those values reflect means of residual errors obtained from the econometric models estimated to have the measures for discretionary accruals, real activities earnings adjustments and managerial ability. The spreading of those values better describes how important the firm specific factor is in our discussion, reason why we also control our results for these factors in the robustness section of this article. Instead, part of the widespreading can also be explained by the different pattern of those measures evolution at the industry level.

In Figure 2 we see that the highest values of this measure are valid for firms operating in constructions and the real estate sector, which is expected if we look to the higher business cycle, the implications for revenue recognition from construction contracts or the deficiencies of costing systems that led to inaccurate accruals and improper allocation of administration and overhead costs.

Table 2

Descriptive Statistics, Source: Authors' Calculation with SPSS 22.0

	Mean	Std. Dev.	Min.	Max.	25 th	75 th	VIF	K.S. test	
								Stat.	Sig.
Dependent variable									
<i>F score</i>	0,361	0,252	0,000	6,472	0,199	0,466	-	0,139	.000 ^a
Independent variables									
BS	7,544	13,51	-36,06	386,3	2,185	8,764	1,826	0,223	.000 ^a
DA	0,041	0,043	0,000	0,519	0,017	0,050	1,109	0,173	.000 ^a
RA	-0,071	0,240	-4,46	1,110	-0,055	0,002	1,053	0,304	.000 ^a
MA	0,000	0,150	-0,825	0,912	-0,017	0,018	1,077	0,321	.000 ^a
Control variables - firm level									
Size	21,45	1,848	14,78	27,04	20,23	22,70	3,087	0,012	.000 ^a
PER	33,61	45,09	0,090	598,2	14,906	34,30	1,131	0,250	.000 ^a
Leverage	1,468	21,63	0,000	2131,5	0,084	1,060	1,080	0,473	.000 ^a
ROA	0,022	0,161	-2,096	2,368	0,011	0,078	1,827	0,250	.000 ^a
Restatement	0,018	0,134	0,000	1,000	0,000	0,000	1,078	0,536	.000 ^a
Audit fee	14,02	1,255	7,208	19,80	13,11	14,82	3,032	0,02	.000 ^a
Control variables - country level									
SARS	5,692	0,286	3,990	6,343	5,571	5,829	2,388	0,161	.000 ^a
Rule of law	1,539	0,237	-0,794	1,891	1,461	1,618	1,746	0,211	.000 ^a
EPU	188,2	101,30	78,22	542,8	112,9	224,4	5,564	0,234	.000 ^a

a. Lilliefors Significance Correction.

The industry impact on the measure of risk of financial statements misstatement seems to be a medium and long-term factor, as both measures of discretionary accruals and real activities earnings adjustments appear to be associated in the long-term with the F score in Figure 3. The business model represents most of the time the basis for financial reporting strategies and policies, because of the design of specific transactions, such as the long-term construction contracts in the constructions area or because of the distinct regulation applicable for the respective sector compared with the other ones of the national economies, like in the case of healthcare firms producing pharmaceutical medicine subject to the claw-back taxation. In our sample, those two sectors recorded the highest number of firms classified as with higher risk of fraudulent financial reporting, representing 176 cases, respectively about 1.46 % from the total sample. However, the risk of fraudulent financial reporting seems to decrease during the

years of the COVID 19 pandemics crisis, having 16 cases in 2019 and 18 cases in 2020, compared to the yearly 32 cases reported in 2016 and 2017. Consequently, it seems that managers pay higher attention to the signals of fraudulent financial reporting in crisis times, as litigation costs are hardly to be supported when there is a low or even negative financial performance.

A similar relatively constant evolution can be observed for the measures of discretionary accruals and of real activities-based earnings adjustments, with a slight decrease from 2014 to 2020. We also emphasize that the measures of those financial ratios-based measures have higher values than the measure of managerial ability, which shows that the divergence in financial reporting misstatements is more prominent than the differences in management efficiency. Such results could imply indirectly a low range of creativity among managers to achieve optimal results, compared to the best top firms in the area

they run their operations. Running DEA for each sector of activity and estimation of industry-based econometric models for the measure of managerial ability brings to attention an insignificant mean value of this measure, which

led us to the conclusion that the firms' profitability and financing decisions are influenced by the industry specific best practice rather than management vision and leadership.

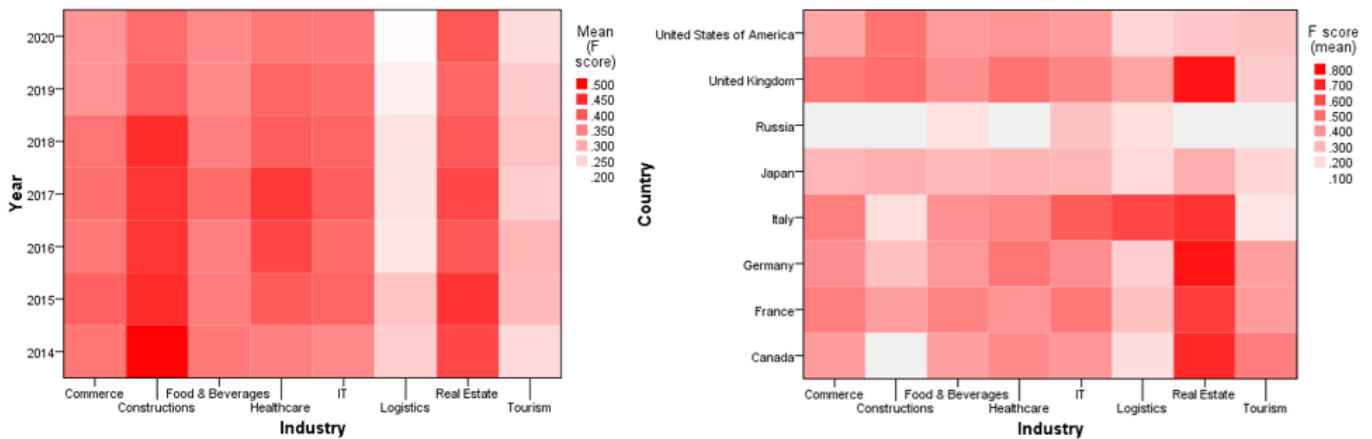


Figure 3. Representation of Misstatement F Score, Source: Authors' Projection with SPSS 22.0

The profile of the companies included in our analysis is reflected by the control variables included in the model, which shows a relative homogeneity in terms of the firms' assets and audit fees. Therefore, the problem of endogeneity is partly solved.

Instead, we have significant differences in the firms' level related to market stocks liquidity and profitability, as the price earnings ratio has a standard deviation of 45.09, higher than its mean of 33.61, providing indication of additional pressure investors place on the management of the firms. Similar significant widespreading describes both the firms' profitability and financing policy, which are specific for each business model, with less impact on the industry features.

Additionally, in Figure 4, we observe that the F score followed a decline over time. However, the period immediately after the COVID 19 pandemic was declared is associated with a slight increase in the F score, especially in

the case of the real estate and commerce sector. Instead, this slight increase is significantly lower than the higher values corresponding to the period between 2014 and 2016. An explanation could be that the financial crisis made most of us aware of the role of the designed enforcement and monitoring systems, implemented and used by national and capital markets authorities (Chen et al., 2019; Kose et al., 2020). Another reason could be the risk of litigation costs perceived by managers and investors' during this pandemic period, highly influenced by the high degree of economic uncertainty. In this circumstance, as the capital markets became more sensitive to any tentative to manipulate financial statements, firms seem to have preferred to go with a more conservative approach on deciding the firms' accounting policies. This approach is confirmed also by the evolution of the discretionary accruals and the real activity based earnings management factor, with the food and beverages sector as an exception.

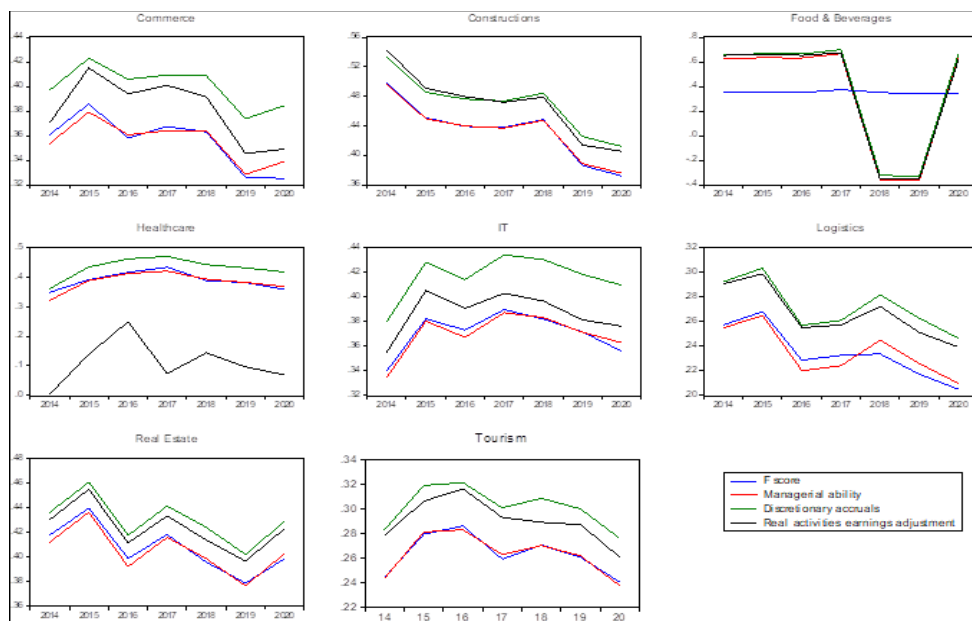


Figure 4. Main Variables Mean Representation, Source: Authors' Projection with SPSS 22.0

The results also highlight that our variables are not normally distributed, as the Kolmogorov-Smirnov test results reject the null hypothesis of normally distributed values (*Sig.* < 0.01). Consequently, we have considered for the robustness section of this article the estimation of quantile regression models as well, to control for any potential deterioration of coefficients. Instead, the variables considered in the estimated models do not present multicollinearity issues, as each variable VIF measure is low (Green, 2019).

Correlation Analysis

Table 3 describes the correlations between the variables considered in the analysis. The results show a relatively low correlation between the F score measure and the measures of financial reporting misrepresentation such as the real activities earnings adjustments (*Stat* = -0.24, *Sig.* < 0.05) or the measure of discretionary accruals (*Stat* = 0.56, *Sig.* < 0.05). However, we observe a higher correlation between the F score and the Altman bankruptcy score (*Stat* = -0.154, *Sig.* < 0.05).

Table 3

Correlation Matrix, Source: Authors' Projection with SPSS 22.0

Variable	F score	Bankruptcy score	Discretionary accruals	Activities accruals	Managerial ability
Bankruptcy score	-.154**				
Discretionary accruals	.056**	-.042**			
Real activities accruals	-.024**	-.096**	.023*		
Managerial ability	-0,006	-0,003	-0,013	.037**	
Size	.036**	-.139**	-.252**	-.092**	-0,023
PER	-.024*	.083**	-.028**	-0,017	0,013
Leverage	0,011	-0,019	-0,006	-0,001	-0,005
ROA	-.067**	.241**	-.130**	-.269**	-0,012
Audit fee	.037**	-.141**	-.143**	-.117**	0,002
Governance score	-0,013	-.031**	-.054**	-.068**	-0,023
SARS	.018*	0,015	-.052**	0,011	-.069**
Rule of law	.064**	.030**	-.050**	0,018	0,001
EPU	.132**	-.061**	.059**	0,016	-0,009

These results suggest a first preference managers have for real activity-based strategies for earnings management, as the F score is more related to identifying financial reporting misstatements, not structural changes in the configuration of the set of resources firms have. On the other hand, the small positive correlation between the F score and the measure of discretionary accruals indicates that the F score is more related to financial accounting numbers and less related to the economic essence of the business model that should be reflected in the financial statements.

Instead, we observe a higher negative correlation between the company size and the measure of discretionary accruals (*Stat* = -0.252, *Sig.* < 0.05), which suggests that smaller firms have lower business planning capabilities, leading to potential more inaccurate accruals. Additionally, we observe that the macroeconomic uncertainty reflected in our study through the economic policy uncertainty index is positively associated with the F score measure (*Stat* = 0.132, *Sig.* < 0.05), meaning that in times of high uncertainty, the risk of financial reporting misstatements and fraud increases. Having the perspective of the well-known fraud triangle, these results show there is opportunity for managers to manipulate financial statements, mainly referring to the economic uncertainty of the macroeconomic context.

Management Ability and Earnings Management Marginal Effect on Firms' Risk of Fraudulent Financial Reporting

In **Table 4** we present the statistics of the estimated OLS and quantile regression models. The approach of quantile regression allows us to have a better understanding of the effect of the variables considered in our analysis and their impact on the probability of fraudulent financial reporting, starting from the proportional relation $Prob = F\ score \cdot 0.0037$, where the denominator is the unconditional probability that a company is a fraudulent reporter, according to the data used by Dechow et. al. (2011).

In **Figure 5** we observe that the F score is differently influenced by the accounting policy discretionary proxies. While the bankruptcy score affects negatively the F score along the quartiles, the managerial ability seems to have a relatively constant effect along the quartiles. Instead, the proxy for the real earnings management and the one reflecting the discretionary accruals indicate an inverse effect on the F score along the quartiles. This result shows that the probability of fraudulent financial reporting increases together with an increase in the impact of real activity-based earnings management strategies in relation to a decrease of the discretionary accruals impact. This evolution shows, similarly to Zang (2012) a complementary relation between the two types of strategy of earnings management.

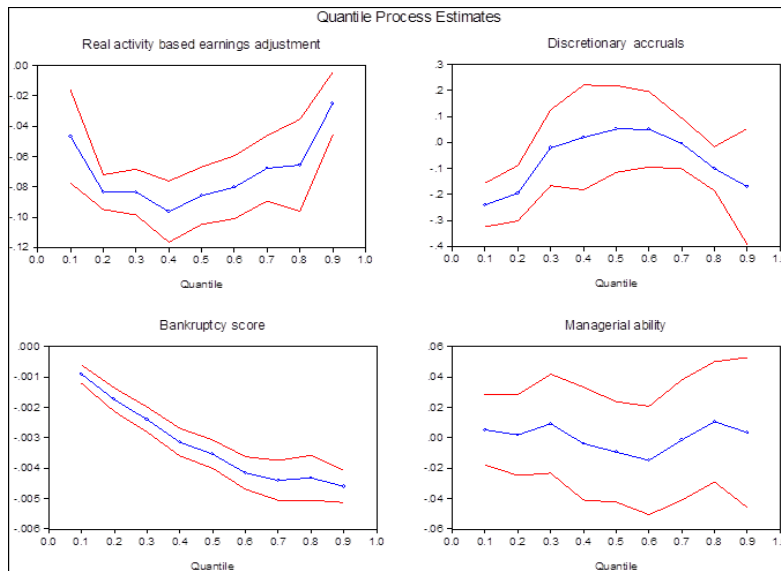


Figure 5. Representation of Quantile Regression Coefficients. *Source: authors' projection with SPSS 22*

Looking at the results related to the models estimated through the OLS method, we get similar results with the ones obtained through the quantile regression models. An interesting observation is that in all models, the Altman bankruptcy score seems to have a negatively and statistically significant effect on the firms' F score, especially in the case of the models that do not include variables reflecting country institutional framework or the firms' specific characteristics. Those results are expected, because in the case of companies with a higher bankruptcy score the stakeholders' attention is more focused on potential earnings management strategies.

The results presented in Table 4 Annex 1 confirm the essential role of real earnings management strategies, with a positive marginal effect statistically significant, both for the model that considers the interaction effects ($Coef = 0,166, Sig. < 0.01$) and for the one taking into account the firm specific financial characteristics ($Coef = 0,436, Sig. < 0.10$). Instead, for the model that doesn't consider country institutional factors, the effect of real earnings management becomes negative on the firms' F score ($Coef = -0,025, Sig. < 0.05$). Those results indicate together that managers proceed to real earnings management only in case of a favorable national institutional context, such as managerial incentives, or avoidance of tax or litigation costs. The results also show that the companies' financing policy ($Coef = 0,0003, Sig. < 0.01$) and operations profitability ($Coef = -0,689, Sig. < 0.01$) are relevant drivers for the decision to proceed to real earnings management. As noted by Christensen & Nikolaev (2018), managers have to reach different targets on agreed debt covenants in order to keep their advantageous contracting conditions. On the other hand, similar with Srivastava (2019), we find that operations profitability has a significant role in the managers' decision to apply potential fraudulent financial reporting schemes, in order to improve the firms' operations financial performance. In these circumstances, the national enforcement institutional framework has a significant

impact on controlling the probability of fraudulent financial reporting ($Coef = -0,125, Sig. < 0.01$), either by implementing various control and monitoring effective tools or establishing penalty costs for non-compliance superior to the benefits managers would gain by proceeding to real earnings management. This national enforcement framework has an even higher marginal impact on the companies' F score once we control for firms' strategies concerning financing and operations profitability, meaning that the states are aware of the opportunities managers have through contracting debt or through achieving profitability targets, in order to gain their management compensation.

We observe that the effect of discretionary accruals is statistically significant only if the model considers the interaction effects with the country institutional framework ($Coef = -4,612, Sig. < 0.01$), without taking into account the companies' specific characteristics. The negative marginal effect determined by discretionary accruals indicates a more conservative approach on managers' choice concerning firms' accounting policies, preferring to produce structural changes in the firms' financial structure rather than in the short and medium-term accounting-based accruals. However, it seems that the interaction effect of the discretionary accruals with the proxy reflecting the quality of accounting and auditing standards determine a positive marginal effect on firms' F score ($Coef = 0.705, Sig. < 0.01$), which indicates that national accounting standards seem to promote a more aggressive accounting policy. As most of the firms in our sample are USA, Canada or UK originated, the Anglo-Saxon accounting approach is visible in our results, showing that discretionary accounting accruals are significantly based on professionals' rationale and forward-looking information.

Pattern Analysis of the Impact of Earnings Management and Management Ability on Firms' Risk of Fraudulent Financial Reporting

In this section, the results presented look for the analysis of long-term cointegration between firms' F score, firms

management ability, discretionary accruals and real earnings management adjustments. We consider this analysis essential as it brings insights into the identification of the aggressive accounting strategies, or conservative accounting strategies, considering that accounting quality resumes not only to changes in financial statements between two consecutive exercises, but in the variation of earnings as well. This variation also refers to the accruals' component, identified as the innate component in the long term.

In Table 5 we provide the summary statistics for the unit roots tests, in order to determine the integration level of our variables. The results suggest that variables considered in the model are $I(0)$ stationary, as all statistics are statistically significant for a level of 99 % and the level values can be used for the estimation of the dynamic regression models.

Table 5

Panel Stationarity Test Results, Source: Authors' Projection with SPSS 22.0

Method	Variables (level)				
	Fraud F score	Discretionary accruals	Real earnings adjustment	Bankruptcy score	Managerial ability
	Stat	Stat	Stat	Stat	Stat
Levin, Lin & Chu t*	-10,44*	-16,39*	-31,79*	-14,15*	-5,599*
ADF - Fisher Chi-square	135,6*	280,6*	770,9*	220,8*	48,22*
PP - Fisher Chi-square	1244,9*	468,4*	361,4*	865,1*	738,4*

* Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution; all other tests assume asymptotic normality; individual intercept considered for level variables on testing; all statistics calculated are significant with 1% significance level.

In Table 6 the Pedroni panel cointegration test results are presented, based on the Engle-Granger traditional cointegration model. The result of all the tests performed indicated with a significance level of 99 % that between F score and our independent variables there is a cointegration relation, meaning this relation should be analyzed according to its long-term dynamic as well, excluding the problem of

the serial correlation we would face with the simple OLS regression method for the time series data (Wooldridge, 2020). For this purpose, we provide in Table 7 the Fully Modified OLS regression results and the Dynamic OLS regression results, considering for the leads and lags the period that minimizes the Akaike information criterion.

Table 6

Panel Cointegration Test Results, Source: Authors' Projection with SPSS 22.0

Method	Individual intercept (level)			
			Weighted	
	Statistic	P-value	Statistic	P-value
Panel v-Statistic	253,72	0,000	246,14	0,000
Panel rho-Statistic	-209,37	0,000	-209,97	0,000
Panel PP-Statistic	-46,039	0,000	-46,558	0,000
Panel ADF-Statistic	-19,806	0,000	-20,576	0,000
Group rho-Statistic	-204,81	0,000		
Group PP-Statistic	-52,377	0,000		
Group ADF-Statistic	-21,406	0,000		

Results in Table 7 confirm once again the significant effect of bankruptcy score ($Coef = -0.003, Sig. < 0.01$) and of the real earnings management adjustments ($Coef = -0,057, Sig. < 0.05$) on the firms' probability of fraudulent financial reporting. The results indicate that managers

would prefer to proceed to earnings management in a long-run perspective, as the F score decreases with -0.057 per each unit increase of the adjustments on earnings determined by real activity-based earnings management transactions.

Table 7

Panel Cointegration Test Results, Source: Authors' Projection with SPSS 22.0

I. Model estimation				
Dependent variable		F score		
Model	(7)		(8)	
	Panel DMOLS		Panel FMOLS	
	Coef.	Std. Error	Coef.	Std. Error

I. Model estimation				
Independent variables				
Discretionary accruals	-0,072	0,152	-0,114	0,078
Bankruptcy score	-0,003*	0,001	-0,004*	0,000
Managerial ability	0,017	0,039	0,016	0,025
Activity earnings adjustments	-0,057**	0,026	-0,064*	0,015
II. Model estimation				
Sample size	2.055		2.652	
R ² adjusted	0,037		0,045	
S.E. of regression	0,183		0,182	
Long-run variance	0,036		0,035	

Therefore, there is a long-run relation between the F score and the real earnings management adjustments, confirming that once managers approve transactions aimed to manipulate and report stable earnings which exceed the targets that condition managers' compensations, the effects are visible in more than one or two next financial exercises. The well-known example of lease-back or the example of intangibles assets capitalization through the discretionary research and development expenses component are

conclusive in this regard. All those policies ensure a more value relevant balance sheet, with the sacrifice of a loss on value relevance of the income statement (Lev, 2018). This means that through real activity-based earnings management strategies, a significant level of earnings persistence is achieved. This component negatively affects the F score as this analytical fraud financial reporting proxy is mainly designed to look for drastic changes from one exercise to another, especially on the level of balance-sheet items.

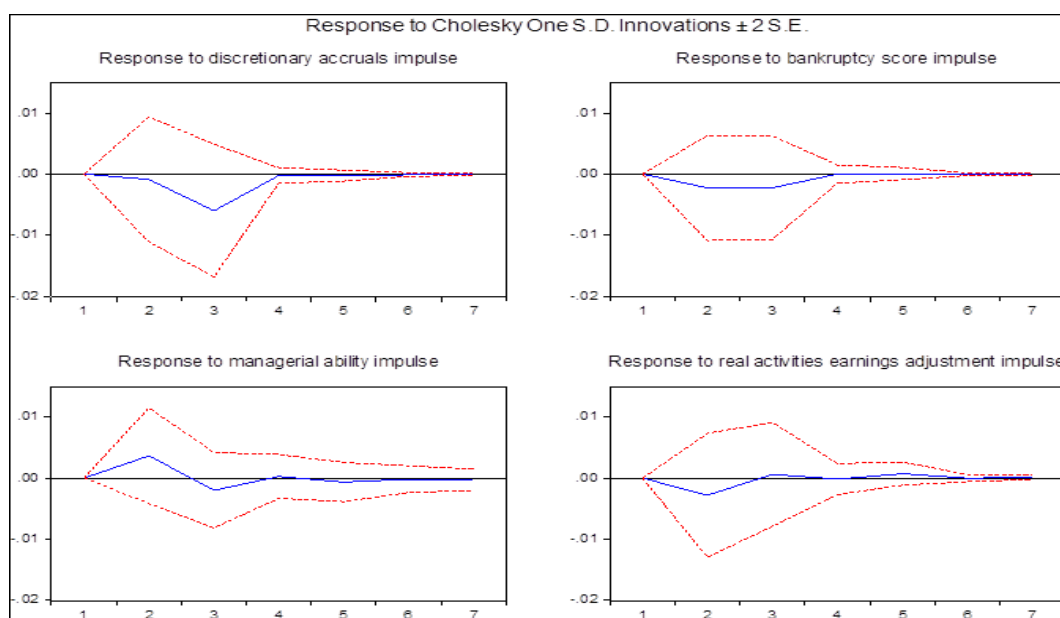


Figure 6. Response of Fraud Risk Measure to Different Shocks, Source: Authors' Projection with SPSS 22.0

This long-term impact is statistically significant and visible up to four periods, as reflected in Figure 6. According to this representation, any shock generated by adjustments made on earnings reported through real activity-based earnings management strategies becomes insignificant only after approximately four following financial exercises. On the other hand, a high risk of bankruptcy score impacts the firms, by putting additional pressure on managers from shareholders and stakeholders for three future financial years. Under those circumstances, managers have to be careful with the key items significantly affecting earnings quality, such as the treatment of revenue recognition, inventory valuation, R&D capitalization, leases, pension plans, or any other liabilities and contingencies, perceived as elementary red flags for potential lower earnings quality.

Conclusions

Our paper addresses the role of earning management measures on the probability of fraudulent financial reporting, through its innate components of discretionary accruals and real activity management adjustments. Additionally, we review the role of management competency, the weakness of corporate governance and the risk of internal control systems override, for the validation purpose of the more recent fraud theories.

The results show that in the long run, the F score is significantly affected by real earnings management activities. The results confirm a similar relationship as well, when analyzing the panel data. Therefore, we can validate our second hypothesis, which reveals a significant impact of the

earnings management on the risk of fraudulent financial reporting.

High risk of bankruptcy also generates an unfavorable environment for fraudulent financial reporting as weakening corporate governance mechanisms and internal control systems are much more difficult because of the higher pressure from the investors' side. Instead, the innate component of accruals seems to reverse over time, having no significant impact in the long term on the fraudulent financial reporting probability. Nonetheless, managerial ability does not significantly impact the probability of fraudulent financial reporting.

The implications of our research raise the need of improvement of the actual fraud detection models, by following a dynamic approach, using a time series analysis methodology to provide a better image of the fraudsters' profile and a robust pattern of the evolution of fundamental earnings management proxies. Considering the long-term effect of the real activities-based earnings management, it is essential that such analytical models used when predicting fraudulent financial reporting integrate information about the pattern of adjustments made through earnings management.

As accruals-based earnings management give rise to a higher risk of non-compliance costs for the firms, managers would prefer real activity-based earnings management. However, for this purpose managers have to be ingenious, with vast experience and expertise to find out optimal solutions for operational activities, restricting and timing. Therefore, in the light of the new fraud theories, the impact of the subjective management decision-making process should be considered as well when assessing the risk of fraudulent financial reporting. For this purpose, we have used the managerial ability construct, as proposed by Demerjian et al. (2012), to describe at least an indirect measure of managers' subjectivism oriented towards achieving economic targets. Instead, we could not validate the first hypothesis as this construct of managerial ability does not have a significant marginal effect on the F score.

We confirm as well how important the evaluation of the risk of bankruptcy is when assessing the one of fraudulent financial reporting. As long as the risk of bankruptcy rises, the investors and the other stakeholders become more aware of the potential losses they can suffer, reason why they invest more time and resources into monitoring management activity, making them more accountable for the vision and the core strategic framework of the firms.

Additionally, we highlight once more the importance of internal control systems and accounting regulation enforcement mechanisms for reducing the risk of fraudulent financial reporting. However, our results show how important the cooperation between authorities responsible for the enforcement of financial reporting regulations, the management of the firms and their investors is. More aggressive regulation in the area of fraudulent financial reporting behavior discourages managers to perform misconduct when preparing the financial statements. Instead, the role of country institutional framework is highly conditioned by the approach of national standard-setters, supporting a high amount of cultural background. A rather punitive oriented enforcement framework, compared with a framework with the focus on more preventive elements is mainly justified in case of systems that limit significantly

professionals' judgment, with indirect implications on the quality of financial statements. Instead, fraudulent financial reporting is discouraged, especially in the case of the high rule of law and high quality of national regulation. Under those circumstances, we consider the characteristics of each national economy extremely relevant, reason why we recommend the use of similar F scores that are estimated considering samples limited to one country or a limited number of countries with similar economic and institutional profile.

Furthermore, we consider the design of analytical models aimed to provide relevant signals on the risk of fraudulent financial reporting should consider industry specific as well, because of the business models specific. Nonetheless, we consider relevant to integrate information concerning firms' corporate governance effectiveness measures in such models. In those circumstances, national regulation and institutional framework can transition more to a rather preventive oriented regulation, which makes firms responsible and accountable for the effectiveness of their own processes, policies and procedures addressing the problem of managing the risk of fraudulent financial reporting. Otherwise, the F score can generate negative effects in the case of firms with robust corporate governance mechanisms, through signaling on capital markets of a higher risk of fraudulent financial reporting than it is in reality. The same rationale can be considered in the case of firms with less effective corporate governance mechanisms.

With the actual trends in the advances in information technology and data mining applications in finance and accounting, we consider the usage of the detection models for a continuous monitoring of the risk of fraudulent financial reporting effective. We also support a dynamic approach of the effects produced by earnings management, which can determine management to be more creative on adding value for the business, not only through aggressive accounting or activity-based earnings management, but also by implementing profitable projects that ensure firms' sustainable growth.

Overall, our results highlight that real activity earnings management could determine a reduction of the risk of fraudulent financial reporting, as the transactions made and the solutions of restructuring operations are reviewed with due diligence for issues of noncompliance. However, our study is subject to limitations as well. First, our sample is limited only to G7 countries. Second, the analysis is resumed to a short period of only seven years, which does not ensure ideal premises for econometric time series analysis. We consider relevant to perform the analysis of this topic with clear focus on specific areas of activity that are more likely to encounter cases of fraudulent financial reporting, such as the financial services sector or the insurances one. Nonetheless, we appreciate a discussion concerning the investors and other stakeholders' roles on the efforts to prevent and identify cases of fraudulent financial reporting extremely relevant, especially for the banking system that is exposed to risk of significant financial loss from low performance credits.

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