Hᴇʟᴀ Fʀɪᴋʜᴀ Cʜᴀᴀʀɪ[*]
University of Tunis

Aᴍᴇʟ Bᴇʟᴀɴᴇ̀s[**]
University of Jeddah
University of Tunis

Aᴢʜᴀᴀʀ Lᴀᴊᴍɪ[***]
University of Tunis

FRAUD RISK AND AUDIT QUALITY:
THE CASE OF US PUBLIC FIRMS

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[*] Contact information: chaari_hela07@yahoo.fr, GEF2A Laboratory – University of Tunis, Tunisia, phone: +1 514 779-7365; ORCID ID: https://orcid.org/0000-0002-5998-1398.

[**] Contact information: amel_bns@yahoo.fr, Department of Finance and Economics, College of Business, University of Jeddah, Jeddah, Saudi Arabia; GEF2A Laboratory – University of Tunis, Tunisia, phone: +966563397927; ORCID ID: https://orcid.org/0000-0002-5745-0243.

[***] Contact information (corresponding author): azhaar.lajmi@isg.rnu.tn, Department of Finance, High Institute of Management, GEF2A Laboratory – University of Tunis, Tunisia, phone: +216-53958536; ORCID ID: https://orcid.org/0000-0003-2726-8341.

Abstract: The study raises questions about the fraud detection technique and the relevance of audit quality to mitigate fraud. The paper suggests a more comprehensive proxy for fraud risk that relies on the combination of Z-score and Beneish M-score. Basing on Logit, regressions are applied to a sample of 5,613 US-listed public firms. The study reveals that the existence of an internal auditor and independent members within the audit committee would potentially reduce the fraud risk. Hiring a Big external auditor and paying it high fees is also helpful. Findings show that, unlike the firm leverage, both firm profitability and growth opportunities have a negative effect of on fraud risk. Leverage provides a motivation for fraudulent financial reporting. It is important to note that this research underscores the audit's monitoring role to mitigate fraud. Also, the adopted model helps regulators, bankers, managers and auditors to detect fraud at an early stage. So needed action can be taken at suitable time. Finally, in this study, we focus on financially distressed companies rather than those with financial restatements. We suggest a collective tool to predict fraud risk; which is expected to offer a more reliable proxy for fraud risk than do binary models.

◼◼◼ INTRODUCTION

Fraud has become a challenge within the finance and accounting profession, and almost all companies and agencies are subject to fraud risks. Some renown companies are nowadays associated with fraud. Providing inaccurate and misleading financial information from those renowned companies has triggered an enduring crisis of confidence. These scandals have seriously impaired audit credibility and raised several questions about corporate governance quality and relevance of audit quality in fraud prevention and detection.

New legislative reform known as the Sarbanes-Oxley Act (SOX) established new transparency standards for public companies. Besides, several anti-fraud measures and anti-false claims laws have been enacted worldwide, namely in the US, allowing public prosecutors to recover damages for fraud and false claims. Thanks to these measures, the number of frauds has decreased after 2002. Companies were also asked to set up a healthy system for control and audit to reduce the fraud occurrence, although the system's weakness does not mean that the fraud could happen (Sanusi & Mohamed, 2015). According to the Financial Security Law, strengthening the governance mechanisms can help prevent fraudulent and manipulative practices; and reduce fraud. Based on the accounting literature, some studies recommend internal audit, audit committee, and external audit as crucial pillars to better cope with frauds (Bajra & Cadez, 2018). However, the association between audit quality and financial statement fraud has been inconsistent in the extant literature.

Therefore, "it is the management's responsibility to design and implement programs and controls to prevent, deter and detect fraud" (AICPA, 2002). Managers must perform a detailed fraud assessment and identify its causes, although the process would be complicated and costly. Too little research has focused on the the usefulness of fraud detection techniques (Beneish, Lee & Nichols, 2012; Roshayani, Sharinah & Normahet, 2015). According to the fraud triangle theory, there are three main elements of the fraud occurrence, the presence of pressure, opportunity and rationalization (Ozcelik, 2020). But risk of fraud is most attributed to the first factor, pressure or incentives. Past studies argue that financially distressed tend to manipulate their financial statements (Beneish et al., 2012; Roshayani et al., 2015). Particularly, failed firms which are financially distressed tend to manipulate their financial statements and are more likely to be involved in fraudulent financial reporting (Altman, 1968; Roshayani et al., 2015). Consistent with these arguments, it is possible to detect fraud at an early stage and mitigate it at its inception by using some prediction tools such as Beneish model and Z-score model. The Altman's Z-score model was accurate in predicting business failure and fraudulent financial reporting as well as the relationship between them (Roshayani et al., 2015). This model is believed to be the most thoroughly tested and broadly accepted distress prediction model in the literature. The Beneish's M-score had correctly revealed some of the most famous fraud cases that occurred later in a subsequent period (Beneish et al., 2012). In line with these arguments, this study argues that the combination of the Z-score model and the Beneish M-score might enhance the prediction of fraud risk (Roshayani et al., 2015). Overall, according to the audit risk model, audit risk is a function of inherent risk, control risk and detection risk. Such a combination of scores would provide a more reliable proxy for fraud occurrence than do previous binary models.

This study has two main objectives. The first objective is to verify whether a collective prediction tool can be used to predict fraud risk. The second objective is to examine the audit's monitoring role through its three pillars, the audit committee, the internal audit and the external audit, while most previous research focused on them separately.

The remainder of the paper is structured as follows. Section 2 reviews the related theoretical framework and develops the research hypotheses. Section 3 describes the research design and data. Section 4 reports and discusses the research findings, and section 5 concludes and suggests future research perspectives.

Theoretical framework and research hypotheses

We focus on three critical pillars of audit quality: internal audit, audit committee, and external audit.

Internal audit

Several researchers highlight the relevant role of internal audits in preventing fraud (Chen, Cumming, Hou & Lee, 2013). Companies with an internal audit are more likely to detect fraud. The latter can independently evaluate fraud risks and anti-fraud measures to implement by the executive board (Petrascu & Tieanu, 2014). Also, the results of Zeng, Yang and Shi (2020) reveal that internal audit is significantly negatively correlated with the occurrence of corporate fraud. However, the internal auditor still needs to use its professional judgment and practical experience in assessing the likelihood of fraud (Sanusi & Mohamed, 2015). Given the above developments, we can formulate our first assumption as follows:

H_1: The existence of an internal audit is expected to reduce fraud risk.

Audit committee

The audit committee effectiveness can be assessed through multiple parameters (Neffati, Khiari & Lajmi, 2021), mainly independence and financial expertise of audit committee members (Lajmi & Gana, 2013; Lajmi & Yab, 2021).

Independence of committee members

Committees, most of whose members are independent, are argued to improve the quality and the transparency of financial reporting and hence to increase the credibility of disclosed financial information (Poretti, Schatt & Bruynseels, 2018). The quality of financial reporting is particularly relevant only in companies with audit committees with at least three members, most of whom are independent (Bajra & Cadez, 2018). Regarding frauds, some empirical studies show a negative and significant association between audit committee effectiveness and fraud occurrence (Chen et al., 2013). Improving audit quality through the audit committee might contribute to decreasing manipulative or fraudulent

practices. In light of these developments, we suggest checking the second hypothesis below:

H_2: The existence of an audit committee, the majority of whose members are independent, is expected to decrease fraud.

Expertise of committee members

The existence of accounting or financial experts within committee members would help develop fair audit procedures and allow a thorough analysis. Besides, it helps reduce earnings management and thus the probability of fraud (Zalata, Tauringana & Tingbani, 2018). By the way, a positive relationship between audit committee financial expertise and earnings quality is expected (Bilal, Chen & Komal, 2018). Besides, financial experts are more likely to detect any financial misstatements as they need to comply with their professional codes of ethics to preserve their reputation (Zalata et al., 2018). Consequently, including within the committee, core competences and skilled-experts would potentially help quite fair earnings management and limit fraudulent accounting practices (Bajra & Cadez, 2018; Zalata et al., 2018). Grounded on the above developments, we state the following hypothesis as follows:

H_3: Audit committee members' expertise is expected to contribute to fraud detection and would hence limit fraudulent practices.

External audit

Following the International Standards on Auditing, an external auditor is responsible to ensure that financial statements mostly do not include any inaccuracies, due to either error or fraud. Therefore, external auditors have a significant role in providing reliable financial reporting. It follows that the existence of external auditors would hinder companies from engaging in fraudulent practices.

Auditor's relevance

Big auditors are expected to provide better audit quality. This is thanks to the expertise knowledge and training that often only Big auditors can afford. Such advantages put external auditors in a great position to suggest useful perspec-

tives on best practices in financial reporting and controls, including the mitigation of fraud risks (Zager, Malis & Novak, 2016). In addition, according to the study conducted by Lajmi, Khiari and Ouertani (2021), Big Four auditors reduce the risk of fraud in companies. Some non-Big Four auditors can afford the same quality of audit like their Big Four peers, though (Jacob, Desai & Agarwalla, 2018). The potential role that Big auditors may play to provide high audit quality motivates hence our fourth hypothesis:

H_4: Companies that are audited by Big auditors are less likely to commit fraud.

Audit fees

Given the agency theory, Jensen and Meckling (1976) note that shareholders support several monitoring costs including audit fees. Accordingly, external auditors must verify whether the company is managed in favor of the shareholder's interest. Some empirical studies put in evidence the negative relationship between auditor's fees and financial misstatements (Li & Ma, 2018), while other studies report a positive association between non-audit fees and fraud risk (Mironiuc & Robu, 2012). For instance, Big auditors require relatively high fees for whom reputation represents a priority from which they will not be diverted (Li and Ma, 2018). Also, according to Saheed, Ajibola and Adedoyin (2021), Audit fees have a significant positive impact on audit quality. Therefore, an adequate level of audit fees will significantly contribute to decreasing fraud risk. These high fees can eventually reveal the thorough examination and the in-depth investigation carried out by the external auditor. It follows that audit fees are positively associated with audit quality (Bryan & Mason, 2016). Based on the above, we develop our fifth hypothesis as follows:

H_5: The higher external audit fees, the better audit quality, the less the fraud occurrence.

Research Methodology

The paper aims at analyzing the impact of audit quality on fraud risk. The following sections present the sample, define the variables, and explain the estimation methodology.

Sample selection

The empirical study examines a sample of 5,613 publicly traded US companies for 11 years spanning from 2003 to 2013. Companies are listed on the three largest US and global stock markets, namely the New York Stock Exchange (NYSE), the National Association of Securities Dealers Automated Quotations (NASDAQ), and the American Stock Exchange (NYSE Amex, often abbreviated as AMEX). The sample does include neither financial institution nor financial service company due to their specific regulatory requirements and accounting and reporting standards. Companies with missing or unavailable data are also excluded from the study sample.

The sample companies operate in several sectors, including agriculture, forestry and fishing, construction, manufacturing, mining, retail trade, transportation services, communications, electricity, gas and sanitary services, and wholesale trade. The data regarding financial statements were extracted from Compustat.

Measurement of variables

Table 1 summarizes all the variables, whether dependent, independent, or controlled, and explains how they are estimated. Fraud risk (Fraud) represents the dependent variable. It is a binary variable. It takes the value one if there is a probability of fraud, and the value zero, otherwise. Fraud refers to the companies' attempt to deceive or mislead investors and creditors through misstatement in accounting statements (Rezaee, 2005).

Based on previous literature, we contend that failed firms which are financially distressed tend to manipulate their financial statements (Roshayani et al., 2015). Therefore, we suggest a collective tool based on a combination of the Altman's Z-score (which predicts the likelihood of bankruptcy) and the Beneish's M-score (which predicts misstatements and earnings manipulation) to enhance the prediction of fraudulent practices.

The model of Altman (1968) is considered by Iazzolino, Migliano and Gregorace (2013) as constituting the basis on which several new models were developed such as Altman (2002).

In addition, Altman has developed other models from its initial model, but these have some particularities in their use which limit their relevance for our

research work. Thus, the other models have been modified to make them more efficient in certain contexts or specifically for certain types of companies. In fact, the Z-Score specifically for the private sector; Z-Score for emerging countries and non-manufacturing firms and the Zeta score for SMEs (Altman, 2002).

Altman's (1968) model was originally created in a large business context. It therefore represents the one being the most appropriate in relation to our research.

The Z-score model was developed by Altman (1968) to assess the bankruptcy risk. To avoid such a risk, executives may engage in aggressive accounting management practices or even fraudulent practices. Altman (1986) Z-score formula sets as follows:

Z-Score = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E (A; B; C; D and E are defined in table 1)

A high score (Z-score> 2.99) reflects the good health of the company and conversely. The lower is the score (Z-score <1.81), the more likely the company is running the bankruptcy risk. Finally, if the Z-score is between these two limits (1.81 <Z-score <2.99), this indicates that the company is in a "gray" zone.

The M-score model developed by Beneish (1999) estimates the likelihood of aggressive account manipulation. M-score is calculated as follows:

M-Score = -4.840 + 0.920 DSRI + 0.528 GMI + 0.404 AQI + 0.892 SGI + 0.115 DEPI - 0.172 SGAI - 0.327 LVGI + 4.697 TATA (All variables are defined in table 1)

If M-score is greater than -2.22, the company is likely engaging in aggressive earnings management and fraudulent practices (red flags).

In our study, we combine both Z-score and M-score into one score to assess the fraud risk as follows:

If Z-score is less than 2.99 and M-score is less than -2.22, then there is a potential risk of fraud, and we assign 1 to the dependent variable Fraud; and 0 otherwise.

Table 1. Definition of variables

Fraud	a binary variable that takes 1 if Z-score is less than 2.99 and M-score is less than -2.22; there is a potential risk of fraud; and 0 otherwise.
Altman Z-score	Z-Score = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E A = Working capital requirement (WCR) / Total assets B = Reserves / Assets C = EBIT / Total Assets D = Market capitalization / Total debts E = Turnover / Total Assets
Beneish M-score	M-Score = -4.840 + 0.920 DSRI + 0.528 GMI + 0.404 AQI + 0.892 SGI + 0.115 DEPI - 0.172 SGAI - 0.327 LVGI + 4.697 TATA $DSRI = [(RECT_t / SALE_t) / (RECT_{t-1} / SALE_{t-1})]$ $GMI = [(1- PPENT_{t-1}) / SALE_{t-1}] / [(1 - PPENT_t) / SALE_t]$ $AQI = [1 - (ACT_t + PPENT_t)/ AT_t] / [1 - (ACT_{t-1} + PPENT_{t-1})/AT_{t-1}]$ $SGI = SALE_t / SALE_{t-1}$ $DEPI = (DP_{t-1} / (DP_{t-1} + PPENT_{t-1})) / (DP_t / (DP_t + PPENT_t))$ $SGAI = (XSGA_t / SALE_t) / (XSGA_{t-1} / SALE_{t-1})$ $LVGI = [(LCTt + DLTTt) / ATt] / [(LCTt-1 + DLTTt-1) / ATt-1]$ $TATA = (IBt - OANCF t) / AT t$
AUD_BIG	a binary variable that takes 1 if external auditor belongs to an international network; 0 otherwise
AUD_FEE	Neperian logarithm of the amount for fees received by the external auditor
CAU_IND	number of independent directors to total number of the audit committee members
CAU_ EXP	binary variable that equals 1 if there are expert members (holding a university degree) in accounting or finance
AI_EXIS	a dichotomous variable that takes 1 if the company has internal audit, and 0 otherwise
Q-Tobin	market value to replacement value of capital
LEV	long-term debt to total assets
ROA	earnings before interest and taxes (EBIT) to total assets

S o u r c e : own study.

To check the presence of the internal audit service, we use the binary variable AI_EXIS (Coram, Ferguson & Moroney, 2008). As for the audit committee, we report two main characteristics: independence (CAU_IND) and the members' expertise (CAU_ EXP). The former is determined by dividing the number of independent directors by the total number of audit committee members (Lajmi & Yab, 2021). The latter provides information on the level of expertise within

the committee. It equals one if some expert members (holding a university degree) in accounting or finance within the committee; otherwise, zero (Bajra & Cadez, 2018; Poretti et al., 2018; Lajmi & Yab, 2021). Finally, regarding the external audit, two aspects are analyzed. We first verify whether it is a Big auditor or not through the variable AUD_BIG. It is a binary variable and equals one if the external auditor belongs to an international network, and zero otherwise (Dakhlaoui, Lajmi & Gana, 2017; Ammar, Shaique & Ul Haq, 2018; Poretti et al., 2018). Secondly, we count for audit fees (AUD_FEE) by measuring the Napierian logarithm of the amount for fees received by the external auditor (Bryan & Mason, 2016).

We consider some financial characteristics of the company, such as leverage, profitability, and opportunities growth, which can influence misstatements in financial reporting and alter fraud risk. The omission of these factors can lead to biased estimations and misleading conclusions.

Regression modeling

Using past fraud cases and applying logit regression analysis would help understand the main causes and factors of fraud occurrence. Our econometric model sets as follows:

$$\text{Fraud}_{it} = \beta_0 + \beta_1 \text{AUD\_BIG}_{it} + \beta_2 \text{AUD\_FEE}_{it} + \beta_3 \text{AUD\_OPI}_{it} + \beta_4 \text{CAU\_IND}_{it}$$
$$+ \beta_5 \text{CAU\_EXP}_{it} + \beta_6 \text{AI\_EXIS}_{it} + \beta_7 \text{Q\_Tobin}_{it} + \beta_8 \text{LEV}_{it} + \beta_9 \text{ROA}_{it} + \varepsilon_{it}$$

All the variables are defined and explained in table 1. The β_0 is the constant in our model, and the β_i correspond to the independent variables' coefficients. The ε constitutes the error term. The index i represents the firm. It ranges from 1 to 5,613. The index t indicates the year and varies from 2003 to 2013. The dependent variable is binary and assesses fraud occurrence.

Results and discussion

Results of univariate and multivariate analyses are reported and discussed in this section.

Univariate analysis

Tables 2 and 3 sum up the descriptive statistics of all variables used in the econometrical modeling, either continuous or binary.

Table 2. Descriptive statistics of continuous variables

Variables	N	Mean	St-deviation	Median	Minimum	Maximum
LEV	30,895	0.197	0.207	0.147	0	0.999
Q_Tobin	30,895	1.462	1.415	1.033	2.414E-7	9.994
ROA	30,895	-0.055	0.554	0.032	-46.304	9.738
AUD_FEE	25,105	5.926	0.615	5.960	0	8.171
CAU_IND	22,828	0.204	0.279	0	0	1.000
LEV: leverage ratio, Q_Tobin: Tobin's Q, ROA: Return on Assets, AUD_FEE: Audit Fees (in thousands of dollars), CAU_IND: Independence of the Audit Committee.						

S o u r c e : researcher's computation.

Table 2 reports that the average audit fee is about 5,926 million USD, and more than half the companies pay about 5,960 million USD. The amount seems to be too high. The high costs of audit fees are considered to be an indicator of the audit quality. Thus, the higher the probability that a fraud occurs, the higher the audit fees are.

It is worth noting that the audit committee members' independence is mandatory for US-listed companies after the publication of the 2002 SOX Act. Indeed, section 301 of the 2002 Sarbanes Oxley Act (SOX) requires the existence of an audit committee within listed companies, whose minimum number of directors is set at three directors, and who must be absolutely independent and competent. In the current paper, we examine the full independence of the mem-

bers of the audit committee. Table 2 reveals that 20.4% of the firms in our sample have an audit committee composed entirely of independent directors.

Beyond audit variables, we consider some control variables related to the company financial characteristics. The debt is relatively low, with a debt-to-equity ratio (LEV) of 20% and a median of 14.67%. These results indicate that the companies of the sample are not heavily indebted. This may be explained by the specificity of the American context characterized by a market-oriented financial system. Table 3 highlights a high Q-Tobin of an average of 1.46, and a median of 1.03. The ratio exceeds 1, which indicates that investors are attracted to invest in these companies. Table 2 also shows a nearly null economic profitability. The average ROA is around -0.06, with a median of 0.03.

Table 3. Descriptive statistics of binary variables

Variables	Valeur	Frequency	Percentage
Fraud	0	18,112	90.94
	1	1,804	9.06
AI_EXIS	0	11,945	39.95
	1	17,953	60.05
CAU_EXP	0	762	3.38
	1	21,784	96.62
AUD_BIG	0	10,275	34.37
	1	19,623	65.63

Fraud: a binary variable that takes 1 if there is a fraud risk, 0 otherwise. AI_EXIS: Existence of internal audit service is a binary variable takes the value 1 if the company has an internal audit service, zero otherwise. AUD_Big: Quality of the External Auditor measured by his membership of large firms. This binary variable takes the value 1 if the external auditor belongs to an international network (Big), 0 otherwise. CAU_EXP: Expertise Committee members, audit is a binary variable equal 1 if there is at least one expert administrator (who has a degree) in accounting and / or finance, 0 otherwise.

S o u r c e : researcher's computation.

Table 3 reports the descriptive statistics for binary variables. The results show that there are only 1,804 cases of potential fraud among the total 19,916 cases among listed public US companies, representing 9.06% of the whole sample. Table 3 also reveals that 60.05% of companies have internal audit services.

Regarding Big Four audit firms, results show that majority of the companies (65.63%) are audited by a Big Four auditor. Besides, 96.62% of the directors have university degrees and professional titles such as Chartered Accountants (CA), Certified Management Accountants (CMA), Certified General Accountants (CGA) et Chartered Professional Accountants (CPA). Such a percentage reveals the high expertise of audit committee members.

We also perform Spearman's rank correlation test to assess multicollinearity problem among variables. The results do not reveal any severe problem of multicollinearity since coefficients do not exceed 0.7. There is no problem of multicollinearity, which can bias our estimations or mislead our conclusions. Table 4 presents Spearman correlation coefficients as well as related significance tests.

Table 4. Correlation matrix

	LEV	Q_Ratio	ROA	AUD_FEE	CAU_IND	AI_EXIS	AUD_Big	CAU_EXP
LEV	1.00000	-0.41330***	-0.15359***	0.04625***	0.07167***	0.21548***	0.02445***	-0.04527***
		<.0001	<.0001	<.0001	<.0001	<.0001	0.0002	<.0001
	30895	30895	30895	29898	29898	25105	22546	22828
Q_Ratio	-0.41330***	1.00000	0.29999***	0.07926***	0.06334***	-0.06210***	-0.02179***	0.03597***
	<.0001		<.0001	<.0001	<.0001	<.0001	0.0011	<.0001
	30895	30895	30895	29898	29898	25105	22546	22828
ROA	-0.15359***	0.29999***	1.00000	0.22443***	0.17848***	0.19931***	0.00411	0.00373
	<.0001	<.0001		<.0001	<.0001	<.0001	0.5374	0.5732
	30895	30895	30895	29898	29898	25105	22546	22828
AUD_FEE	0.21548***	-0.06210***	0.19931***	0.61326***	0.61576***	1.00000	0.08868***	-0.10098***
	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001
	25105	25105	25105	24687	24687	25105	20251	20491
CAU_IND	-0.04527***	0.03597***	0.00373	-0.13862***	0.02465***	-0.10098***	-0.12085***	1.00000
	<.0001	<.0001	0.5732	<.0001	0.0002	<.0001	<.0001	
	22828	22828	22828	22175	22175	20491	22546	22828
AI_EXIS	0.04625***	0.07926***	0.22443***	1.00000	0.46296***	0.61326***	0.14585***	-0.13862***
	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001
	29898	29898	29898	29898	29898	24687	21899	22175
AUD_Big	0.07167***	0.06334***	0.17848***	0.46296***	1.00000	0.61576***	0.01765***	0.02465***
	<.0001	<.0001	<.0001	<.0001		<.0001	0.0090	0.0002
	29898	29898	29898	29898	29898	24687	21899	22175
CAU_EXP	0.02445***	-0.02179***	0.00411	0.14585***	0.01765***	0.08868***	1.00000	-0.12085***
	0.0002	0.0011	0.5374	<.0001	0.0090	<.0001		<.0001
	22546	22546	22546	21899	21899	20251	22546	22546
Prob > |r| under H_0: $Rh_o = 0$ as well as the number of observations								

Table 4. Correlation...

	LEV	Q_Ratio	ROA	AUD_FEE	CAU_IND	AI_EXIS	AUD_Big	CAU_EXP
AUD_Big: External Auditor's Affiliation, AUD_FEE: Audit Fees, CAU_IND: Independence of Audit Committee, CAU_EXP: Audit Committee Expertise, AI_EXIS: Existence of Internal Audit Service, Q_Tobin: Tobin Q, LEV: Corporate Debt, ROA: Profitability or Return on Assets. *, **, *** correspond to the statistics' significance at the thresholds of 10%, 5%, 1%, respectively.								

S o u r c e : researcher's computation.

Multivariate analysis

Table 5 summarizes the regression results related to the relationship between audit and fraud. The first hypothesis (H1) is confirmed, as there is a significant negative relationship between the internal audit and the fraud risk. Such a result indicates that an internal audit cell within the firm would contribute to control fraudulent practices. Empirical findings highlight the key role of internal audit to reduce fraud and prevent misappropriation and corruption. Such a result is in line with the findings of Gullkvist and Jokipii (2013). Table 5 also provides support to the second hypothesis (H2). This result suggests that audit committee members' independence has a significant negative impact on the probability of fraud. Indeed, independence of audit committee directors allows them to control more efficiently the process of audit quality. Likewise, managers are less eager to be involved in fraudulent behavior. These results converge with several previous studies that argue that the presence of audit committee, whose majority members are independent, helps reduce manipulative and non-complying practices (Rainsbury, Bradbury & Cahan, 2009).

Table 5. Results of the impact of audit on fraud

Variables	DF	Estimation	Standard Error	Wald Chi-deux	Pr > Chi²
Constante	1	-0.2614	0.3503	0.5571	0.4554
LEV	1	1.9567	0.1209	261.9600	0.0001***
Q_Tobin	1	-0.2280	0.0266	73.6587	0.0001***
ROA	1	-0.4352	0.0859	25.6933	0.0001***

Table 5. Results...

Variables	DF	Estimation	Standard Error	Wald Chi-deux	Pr > Chi²
Constante	1	-0.2614	0.3503	0.5571	0.4554
LEV	1	1.9567	0.1209	261.9600	0.0001***
AI_EXIS	1	-0.3428	0.0647	28.0484	0.0001***
AUD_BIG	1	-0.1547	0.0671	5.3098	0.0212**
AUD_FEE	1	-0.3238	0.0601	28.9807	0.0001***
CAU_EXP	1	0.0361	0.1358	0.0706	0.7905
CAU_IND	1	-0.0190	0.0908	0.0440	0.0833*
Test of the null hypothesis: BETA=0					
Test	Chi-deux	DF	Pr > Chi²		
Ratio of likelihood	660.0053	9	<.0001***		
Fisher	702.2342	9	<.0001***		
Wald	637.8153	9	<.0001***		
AUD_Big: External Auditor's Affiliation, AUD_FEE: Audit Fees, CAU_IND: Independence of Audit Committee, CAU_EXP: Audit Committee Expertise, AI_EXIS: Existence of Internal Audit Service, Q_Tobin: Tobin Q, LEV: Corporate Debt, ROA: Profitability or Return on Assets. *, **, *** correspond to the statistics' significance at the thresholds of 10%, 5%, 1%, respectively.					

S o u r c e : researcher's computation.

Table 5 does not provide support to the third hypothesis (H3). There is no significant relationship between the expertise of audit committee members and the fraud risk. In contrast, this study finds a significant negative relationship between the relevance of the external auditor and the fraud risk. It follows that the external auditor's affiliation with an international network reflects the audit quality and demonstrates its effectiveness in preventing and detecting fraud. Moreover, table 5 shows as well that the fifth hypothesis (H5) is confirmed. This result suggests that there is a significant negative relationship between the audit fee and the fraud occurrence. It seems that auditors with high fees are likely to meet the audit competency criterion. Therefore, they are likely to detect most accounting errors as well as significant anomalies either caused unintentionally or due to fraud, as argued by Bilal et al. (2018), among others.

Finally, table 5 reports a significant positive relationship between leverage and fraud risk. Leverage provides a motivation to commit fraud (Ammar et al., 2018).

On the other hand, table 5 shows a significant negative relationship between firm's growth opportunities and fraud. There is also a similar relationship between firm profitability and fraud. Firms with significant growth opportunities are less eager to engage in fraudulent practices. These companies are often short of fund and look for external resources to finance their investment opportunities. Similarly, profitable firms are not prone to manage their earnings and follow misstatement and fraudulent practices.

■■■ Conclusion

This study raises questions about the fraud detection technique and the relevance of audit quality to mitigate fraud. This study has two main objectives. The first objective is to verify whether a collective prediction tool can be used to predict fraud risk. The second objective is to examine the audit's monitoring role to mitigate fraud risk. Logit regressions are applied to a sample of 5,613 US-listed public firms during 2003–2013. The paper suggests a more comprehensive proxy for fraud risk that relies on the combination of Z-score and Beish M-score.

The study reveals that the existence of an internal auditor and independent members within the audit committee would potentially reduce the fraud risk. Hiring a Big external auditor and paying it high fees is also helpful. Overall, contrary to recent criticism, this paper provides compelling evidence that assuring high-quality information is consistently associated with a lower incidence of fraud. Our results underline the importance of several recommendations that have strengthened the monitoring and oversight role that audit plays in the financial reporting process through internal audit, audit committee, and external audit. Furthermore, the study puts in evidence that, unlike the firm leverage, both firm profitability and growth opportunities have a negative effect on fraud risk. Leverage provides a motivation for fraudulent financial reporting.

This study is related to several strands of existing research, namely the quality of audit, the effective use of financial information, fraud detection techniques. Several practical implications can be associated with this study. First, the research underscores the audit's monitoring role to mitigate fraud. Second,

the adopted model would help regulators, bankers, managers and auditors to detect fraud at an early stage. So needed action can be taken at suitable time. The study also offers two main contributions. Unlike most previous research, we focus on financially distressed companies rather than those with financial restatements. Besides, we suggest a collective tool to predict fraud risk; which is expected to offer a more reliable proxy for fraud risk than do binary models.

Fraud is still a relevant theme for academic research. There are several future research perspectives for this research. Other factors of audit quality, such as internal audit effectiveness, external audit tenure, or audit committee diligence, are worth investigating and may lead to more interesting practical implications and recommendations. Besides, it would be better to estimate the fraud occurrence itself rather than the probability of fraud. An in-depth analysis is hence required.

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