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# The informational value contained in the different types of auditor's opinions: Evidence from Portugal

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**Abstract:** This paper examines the distinct types of modified auditor opinions and the non-compliance with the legal certification of accounts, to assess whether they provide different relevant informational content on the risk of impending bankruptcies. The study also addresses the signalling effects when firms do not comply with disclosure obligations. Controlling for the a priori risk classification, we find that distinct opinion types have dissimilar marginal influences, with a disclaimer of opinion denoting the highest level of risk, followed by the non-compliance with the legal certification of accounts and the issuance of an auditor's adverse opinion. The odds of a firm becoming failed are significantly greater when emphases and reserves are issued by a Big 4 auditor. These findings are based on the evidence of 36,509 firms in Portugal, a country characterized by a proportionately high number of small-sized audited firms and by a lack of independent oversight of auditors, which makes it a relevant setting to analyse.

**Subjects: Corporate Finance; Auditing; Financial Management; Financial Statement Analysis; Risk Management**

**Keywords: audit qualifications; bankruptcy prediction; going concern opinions; auditor size; auditor report**

**JEL Classification: G33; M41; M42**

## 1. Introduction

Due to auditors' privileged access to relevant information on the true financial condition of a firm, their going concern opinions (GCOs) are expected to contain an informational value for predicting impending bankruptcies. The extent to which this supposed informational value leads to the incremental accuracy of models that predict bankruptcy is still an ongoing examination, with some mixed evidence reported so far. Some previous empirical research on bankruptcy forecasting models has found that qualified audit opinions increase the accuracy of such models (e.g., Altman et al., 2010; Chen & Church, 1992; Hopwood et al., 1989; Senteney et al., 2006).

Czerney et al. (2014) further investigate the relevance of unqualified audit reports, focusing on the explanatory language added by the auditor, with the results showing that this type of report transmits information about financial reporting quality. Auditor changes are inclusively confirmed as conveying relevant information for predicting impending bankruptcy (Senteney et al., 2006). Nonetheless, another set of studies claims that audit reports do not add relevant incremental

information to bankruptcy prediction models (e.g., Lennox, 1999), or even lack adequate warnings before the bankruptcy event (Geiger et al., 2014; Geiger & Rama, 2006).

We contribute to the previous line of research in several ways. We expand the examination on the informational value of the auditor's report by detailing the marginal contribution per type of audit opinion, as previous literature provides only scarce evidence on the information per type of opinion. A detailed analysis of the nature of qualified opinions, namely their consistency, going concern, and other subject-to qualifications, has been put forward by Hopwood et al. (1989). We focus on the marginal contribution per type of audit opinion and confirm whether the different disclosures included by auditors in their reports, in line with the international auditing standards, contain distinct informational values for bankruptcy prediction. Specifically, we analyse the informational value of emphases, reservations, disclaimers of opinion, and adverse opinions. These opinion types express different levels of information and warning, ranging from a softer tone in an emphasis to more troubling signalling in a disclaimer of opinion, and especially in an adverse one.

Our study also addresses the potential signalling effects revealed by the opacity underlying the non-compliance of firms' disclosure obligations, explicitly concerning the requirement to have their accounts certified by an independent auditor. To the best of our knowledge, the informational content revealed by this feeble financial transparency has not yet been duly analysed in previous literature. Lastly, motivated by prior research (e.g., Berglund et al., 2018; Comprix & Huang, 2015; DeFond & Lennox, 2011; Feldman & Read, 2010; Kyriakou, 2020; Reichelt & Wang, 2010), we also evaluate the informational value of the type of audit opinion while accounting for the auditor size.

We use the empirical evidence of non-financial firms in Portugal, as several idiosyncrasies in this country provide a relevant setting to analyse. First, we can assess the informational value of the auditor's report on the going concern assumption in a country with a reduced representativeness of stock markets, which contrasts with the contexts investigated by most studies (by and large, the US and the UK).[1] In contrast to countries with meaningful stock markets, thus with a larger proportion of firms under stricter financial statement disclosure requirements, in Portugal there is a somewhat insignificant number of firms whose financial reporting environment is governed by a securities and market authority.[2] This context inhibits investors to infer the probability of bankruptcy for most large firms based on the respective market values, granting auditors in Portugal a prominent role as signalling sources on the exact financial health of audited firms. Hence, without the interference from the market's a priori assessment, we may more precisely compute the potential incremental accuracy of auditors' opinions in predicting impending bankruptcies, compared to other settings where representative stock market data abound.

Second, there is a lack of effective oversight in Portugal regarding the non-compliance of legal account certification, as reflected in a significant proportion of non-compliant firms (6.9%). Such a circumstance allows us to measure the extent to which this non-compliance conveys relevant information about impending financial distress.

A third aspect that makes it a relevant case study is that, in Portugal, the entrepreneurial context is vastly dominated by small and medium-sized enterprises (SMEs) (99.9% of the total number of enterprises), and since 2002 audit exemption thresholds have been kept very low (in the UK such thresholds are four times higher). In practical terms, the thresholds in Portugal only apply to limited partnerships or sole proprietorships (Accountancy Europe, 2021), as no audit threshold exists for public limited companies. Therefore, compared to other European countries, in proportional terms, there is a substantially higher number of audited firms in Portugal, some of which are very small. Fourth, there is no national guidance on the proportionate application of the International Standards on Auditing (ISAs) for audits of SMEs, as opposed to the cases of France, the UK, Germany, and Italy, among others (Accountancy Europe, 2018). Finally, until 2016, the oversight of the audit profession in terms of standard-setting, quality assurance, and inspections, as well as disciplinary measures, was delegated to professional bodies. To sum up, it is important

to assess the informativeness of auditors' opinions in such a setting, where many companies need to be audited, all sharing the same rules despite some of them being very small, and where the independence of the auditors during the period analysed falls behind the level observed in other countries, such as the UK (e.g., Fédération des Experts Comptables Européens [FEE] Survey, 2015).[3]

The methodology we follow is in line with previous related research, particularly Ohlson (1980), Lennox (1999), Geiger et al. (2005), E. I. Altman and Sabato (2007), Sun (2007), Altman et al. (2010), and Cenciarelli et al. (2018). Our results confirm that most audited firms that became bankrupt had received previous negative auditors' opinions. In the reporting period before bankruptcy, 77% of these firms contained at least an emphasis, a reservation, an adverse opinion, or a disclaimer of opinion by the auditor. We find that the marginal informational value of these opinion types for predicting bankruptcy is dissimilar. Firms with a certification of accounts (CA) without reservation or emphasis (i.e., those being given an unqualified opinion or clean report), especially when they are audited by large-size auditors, reveal a relatively lower bankruptcy risk. Conversely, a disclaimer of opinion stands out as signalling the highest bankruptcy risk. Cases with a very high risk seem therefore to be characterized by opacity in the firm's financial statements, in which circumstance the auditor lacks enough evidence to form a sustained opinion on the going concern.

The findings in our study have important economic implications. For investors, creditors, customers, and suppliers, our results indicate the true informational content related to the distinct audit opinion types. This is a key issue for banks to be able to accurately model and assess the credit risk of their loans to firms.

Moreover, in confirming significant differences in the informational content per auditor size, our findings similarly underline that is not only the message transmitted that is relevant; the messenger itself (i.e., the auditor) also matters, regardless of the audit setting (e.g., Cenciarelli et al. (2018) reach similar evidence on the relevance of auditor attributes based on evidence from US public companies).

The remainder of this paper is composed of four sections. Section 2 clarifies the requirements for the going concern assumption and reviews previous research on bankruptcy forecasting and the potential informational value of auditors' opinions. This section also defines the hypotheses. Section 3 explains the methodology of the research and details the data. Section 4 presents and discusses the results of the research. Section 5 provides the conclusions.

## 2. Background and hypotheses

### *2.1. International auditing standards*

On filing firms' financial statements, the management should evaluate and report any material uncertainties on the going concern, particularly for the 12 months following the date of the financial statements. Subsequently, auditors assess the adequacy and accuracy of disclosures in this regard. The previous clarity of obligations serves two purposes: i) to communicate whether the assets have been realized, and the liabilities will be settled through the normal operations of the firm (the business continuity perspective), or if, on the contrary, they will probably be settled through the firm's liquidation (the liquidation perspective); ii) provide information on whether the firm will continue to exercise or close its business within the next 12 months.

Normally, only large firms are required to have their accounts legally certified by an independent statutory auditor (SA). In firms with such a requirement, auditors are expected to have privileged access to the firm's information, and thus be able to provide adequate signalling whenever the firm is unlikely to remain a going concern and its operations are expected to cease in the 12 months following the date of the balance sheet. The international auditing standard 570 (International Auditing and Assurance Standards Board [International Auditing and Assurance

Standards Board, 2009), also known as ISA 570—Business Continuity, requires auditors to conclude whether there are material uncertainties as to the ability of a firm to continue as a going concern and to assess if the firm's management has properly used this assumption. Among the information auditors are expected to consider, ISA 570 highlights the occurrence of events such as: i) the firm has a net liability position (i.e., has a negative worth); ii) there is an excessive reliance on short-term loans to finance medium- to long-term assets; iii) lenders and trade creditors are withdrawing their financial support; iv) the firm is unable to obtain or renew financing or to pay creditors on due dates; v) there is a negative treasury; vi) operating income is substantially negative; vii) the firm has lost licences to exercise its activity and/or lost a relevant customer; viii) there are pending lawsuits against the firm that may result in claims that it cannot meet; and ix) legal or regulatory changes are expected to adversely affect the firm.

Whenever the financial statements have been fairly and correctly presented, the auditor issues a clean (unqualified) opinion. For the other situations, the international auditing standards impose a qualified or modified opinion. In that case, the auditor may select one or a combination of the following types:

- *Reservation*. In this case, material uncertainties about the audited firm's continuity exist, but no adequate disclosure was made. This opinion type results from either a misstatement of the financial statements (deviations from the accepted accounting standards) or from a scope limitation, when the auditor was unable to pull together enough evidence on which to base the audit. The misstatement is considered material when it may shape the decisions of users of the financial statements; it is considered pervasive if a considerable number of the financial statements are affected. A qualified opinion with a reservation applies to cases where just materiality is detected.
- *Adverse opinion*. If both materiality and pervasiveness are found when a departure from the accepted accounting standards exists, the auditor report contains an adverse opinion.
- *Disclaimer of opinion*. In the presence of materiality and pervasiveness, a disclaimer of opinion is issued due to a scope limitation, as the auditor cannot verify and gather sufficient and appropriate evidence on most of the audited firm's financial statements.

Additionally, the audit report may also contain an emphasis of matter paragraph to draw attention to relevant issues presented or disclosed in the financial statements, such as material uncertainties, or other lighter remarks to assist users in understanding the financial statements. Whenever the auditor selects an emphasis, an explanation of the underlying causes is required. In practice, an emphasis expresses a softer concern than a reservation and even more so than a disclaimer of opinion or an adverse opinion. We should note that, unless they are contradictory, theoretically more than one of the previous types may be selected by the auditor for the same firm. In our dataset, some firms have an emphasis together with a reservation or an adverse opinion.

Whenever an auditor issues a GCO, the audited firm has been given at least one of the previous qualified opinion types. Carson et al. (2013) provide a synopsis of previous literature on audit reporting for going concern uncertainties and note that auditors are more likely to issue GCOs to smaller and less profitable firms, as well as those with higher leverage and lower liquidity.

More recently, with new regulation in the European Union introduced at the same time as the revised International Standard on Accounting (ISA 701), auditors have to disclose the key audit matters (KAMs) as significant risks, transactions or events, or significant judgments. Pinto and Morais (2019) find that litigation risk, reputation loss, audit-client relationship, the precision of accounting standards and the effect of regulators and supervisors activities influence the number of KAMs in auditors' reports. Nonetheless, despite the ongoing concern by international bodies, Hegazy and Kamareldawla (2021) conclude that the current explanations of ISA 701 may not adequately assist some auditors in their goal of properly identifying all KAMs across different matters. Segal (2019) reaches a similar conclusion to that of leading audit experts, revealing various perceptions of what makes a key issue. The differences between auditors may be related

to the concept of materiality, the subjectivity and difficulty associated with understanding certain details of the companies' business, and the assessment of the temporal effects of events.

### *2.2. Bankruptcy forecasting*

Among other factors, the auditors' assessment depends on ratios determined from the financial statements, which are mostly public information. Some studies emphasize the importance of financial ratios in qualified audit opinions, notably Levitan and Knoblett (1985), Mutchler (1986), and McKeown et al. (1991). From a financial point of view as well, the auditors' assessment may also consider future perspectives not only concerning the financial performance, but also regarding debt repayment schemes, in addition to the availability of financing and alternative funding sources.

The outputs from bankruptcy forecasting models may likewise provide a valuable contribution to auditors' reports. Altman and McGough (1974) were among the first to suggest the use of bankruptcy prediction models to help an auditor make an evaluation. As emphasized by Koh (1991), if they are accurate, such models may mitigate the potential hurdles the auditor faces in detecting firms with significant going concern risks. Particularly noteworthy approaches and models relying on financial ratios and other financial information to predict bankruptcy and credit default include the seminal works of Beaver (1966), Altman (1968), Ohlson (1980), Coats and Fant (1993), Shumway (2001), and Campbell et al. (2008).

### *2.3. The potential informational value of auditors' GCOs*

Some studies (Altman & McGough, 1974; Koh, 1991; Lennox, 1999; Sun, 2007) provide evidence of statistical models outperforming the accuracy of auditors' GCOs in forecasting bankruptcy, which raises questions as to the value added by auditors' GCOs to predicting impending bankruptcies. For example, Foster et al. (1998) note that auditors' GCOs do not add significant predictive information when loan defaults and covenant violations are controlled for. Lennox (1999) indicates that audit reports do not provide useful incremental information on the probability of bankruptcy when that probability is calculated while controlling for a wider set of public information. According to that author, an explanation for this lack of informativeness lies in the auditors' reluctance to give first-time qualifications or change their opinions from a previous clean opinion.

On the other hand, other works confirm that auditors' modified opinions provide additional statistically significant information to a model predicting bankruptcy. For example, controlling for the financial information already used by forecasting, Hopwood et al. (1989, 1994) confirm that the auditors' comments on the going concern assumption add relevant information for predicting bankruptcy. By studying the qualified audit opinions on the going concern assumption, Chen and Church (1992) reach a similar conclusion; they find that the inclusion of the qualified audit opinion in a prediction model with financial ratios significantly increases the prediction accuracy of the model. Senteney et al. (2006) also add evidence on the significance of auditors' GCOs for predicting bankruptcy. Altman et al. (2010) develop a default prediction model for SMEs in the UK, which includes financial variables together with non-financial information, namely audit opinions; they find that audit opinions make a significant contribution to the model's prediction power. This is one of the few known studies that analyse the effects per opinion type, although it does not report striking differences among them.

The discussion about the relations between GCOs, bankruptcy prediction models, and observed future bankruptcy extends inclusively to two related effects, namely the potential effect of the auditor's GCO on future bankruptcies, and the influence of models predicting default on the auditor's GCO. The first one, known as the self-fulfilling prophecy problem, is motivated by collateral effects from the issuance of a GCO, such as loan denials resulting from negative signs the GCO conveys, which ultimately may jeopardize the survival of the audited firm. The second emerges with feedback outcomes and a circularity problem that may exist in auditors using outputs from models predicting bankruptcy when these already include auditors' GCOs as input.

Garsombke and Choi (1992), Taffler and Citron (2001), Pryor and Terza (2002), and Geiger et al. (2005) are among those who have discussed and studied some of these effects.

Due to a lack of consistent evidence on the incremental informational value of GCOs, this issue deserves further research. We aim to provide additional information on this theme and test the value that auditors' private information and their opinions may add to bankruptcy forecasting models based on public information. To do so, we further analyse the extent to which the auditor report may contain distinct informational value depending on the categories of disclosures that such a report shows. If one category adds informational value to bankruptcy forecasting, then we may conclude that GCOs also contain an incremental informational value; however, we may conclude that such a value is dissimilar depending on the disclosure category. We thus define our first hypothesis as:

**H1** *Auditors' types of opinions contribute different informational values to bankruptcy forecasting.*

Concerning the information disclosed and signalling an opaque posture towards disclosure obligations, some firms required to have their accounts certified by an independent auditor may not even comply with such requirements. This is the case whenever the firm does not appoint an SA or, if it does, the firm does not disclose certified accounts. In either case, the opacity is possibly related to firms seeking to hide relevant negative facts from investors, which may signal that more serious financial problems are approaching. The potential audit delay is a related aspect that has been studied recently by several authors, namely Khamisah et al. (2021), Angelia and Mawardi (2021), Rani and Triani (2021), among others. They have concluded that financial distress has non-negligible effects on audit report lags. As companies facing a financial distress situation represent an increased risk for auditors exposure, they produce a greater incentive for auditors to dig deeper into their work and take more time in their analysis. The delay can be penalized differently by the authorities in each country, which influences the delay or the non disclosure of certified accounts. This reasoning leads us to our second hypothesis:

**H2** *Non-compliance with the CA denotes a higher bankruptcy risk.*

Regardless of the desired objectivity behind the exhaustive listing of factors in ISA 570, used as a benchmark for issuing a modified GCO, there is room for some discretion in auditors' analyses. Even removing any subjectivity from the analysis, the auditor's opinion on future events regarding the firm would not always be entirely correct. Indeed, similarly to bankruptcy forecasting models, auditors are exposed to misclassification errors in their opinions, which can potentially harm their activity.

As highlighted by Chen and Church (1992), Hopwood et al. (1994), Sun (2007), Geiger et al. (2014), and Ittonen et al. (2017), among others, auditors are doubly exposed to the adverse effects of misjudgements relative to the going concern assumptions. Some firms may file for bankruptcy although they did not obtain any prior modified GCO, which undermines the auditors' public credibility. Other firms may receive a modified GCO but remain viable afterward; such a misclassification may weaken the auditor's relationship with the audited firm, or even generate the self-fulfilling prophecy issue.

Depending on their perception of costs from both types of misclassifications, auditors may adopt a more flexible or conservative judgment towards the going concern assumption. Geiger and Rama (2006) show that auditor size also is related to the extent of such errors, with Big 4 auditors (Deloitte, EY, KPMG, and PwC) related to lower misclassification errors when compared to others. Other studies (DeFond & Lennox, 2011; Feldman & Read, 2010; Reichelt & Wang, 2010) find that

firms audited by one of the Big 4 are less likely to receive a GCO and relate this to the better financial condition of such firms. Furthermore, Berglund et al. (2018) find that compared to mid-tier audit firms, the Big 4 audit firms report more conservatively and are more likely to issue GCOs to distressed firms.

Therefore, it seems reasonable to admit that the size of the auditor may also provide informational content to a model predicting business bankruptcy. Accordingly, we define the following hypothesis:

**H3**: *Big 4 and non-Big 4 audit reports have different informational values when assessing the bankruptcy risk.*

## 3. Method and data

### *3.1. Sample description*

We use the data for Portuguese firms registered in the Informa D&B database, which contains details from the IES.[4] Our dataset was originally built from the financial statements of all non-financial firms that filed their accounts and are listed in the Commercial Register between 2011 and 2016. From 2011 to 2013, the Portuguese economy underwent a profound recession, with many firms and their auditors under intense pressure, while the remaining period corresponds to the economic rebound. Thus, our sample reflects in a balanced manner the effects of macroeconomic peaks and troughs. For each firm, we obtain the audit information when available, as well as the respective failure score assigned by Informa D&B.[5] We retrieve accounting and financial data from SABI, a financial database powered by Bureau Van Dijk. We consider that failure occurs whenever a firm is liquidated and closes its activity but maintains outstanding debts, a condition financially identical to bankruptcy, which is also included.

Hence, from an original dataset composed of 1,808,815 firm-years with a failure score from Informa D&B (Table 1), we select all firms required to have a CA provided by an SA. We acquire a dataset of 36,509 firms corresponding to 150,105 firm-years, of which 737 failed within one year after the date of their last accounts. Computing the failure rate in this subset of observations, we obtain a value (0.49%) close to the one observed for all firms that filed their accounts (0.44%). The annual decrease in the percentage of failed cases confirms the progressive fading of the effects of financial stress in Portugal between 2010 and 2014.

**Table 1. Distribution of firm-years that filed their accounts and have been assigned a failure score**

| | Cases that filed accounts | | | Cases required to have certification of accounts | | |
|---|---|---|---|---|---|---|
| | | Failed | | | Failed | |
| Year | Total | (#) | (% of total) | Total | (#) | (% of total) |
| 2011 | 312,409 | 2,269 | 0.73% | 26,674 | 222 | 0.83% |
| 2012 | 308,509 | 1,302 | 0.42% | 27,040 | 126 | 0.47% |
| 2013 | 307,748 | 1,447 | 0.47% | 26,622 | 128 | 0.48% |
| 2014 | 272,425 | 1,009 | 0.37% | 21,635 | 83 | 0.38% |
| 2015 | 313,495 | 1,015 | 0.32% | 25,872 | 96 | 0.37% |
| 2016 | 294,229 | 904 | 0.31% | 22,262 | 82 | 0.37% |
| **Total** | **1,808,815** | **7,946** | **0.44%** | **150,105** | **737** | **0.49%** |

**Table 2. Distribution of failed and non-failed cases required to have a CA per CA compliance and SA appointment**

| | Failed | | Non-failed | | Total |
|---|---|---|---|---|---|
| Firms required to have a CA | 737 | 100% | 149,368 | 100% | 150,105 |
| • did not comply with the CA | 235 | 31.9% | 10,160 | 6.8% | 10,395 |
| • did not appoint an SA | 85 | 11.5% | 3,275 | 2.2% | 3,360 |

Some firms required to have a CA may not comply with such a requirement by not appointing an SA. Even those with an SA may not meet the requirement if they file uncertified accounts. In this case, although an auditor has been appointed, the firm's reporting does not include an auditor's opinion, either because no financial statements were provided to the auditor, or the payment for the auditing services is in arrears, in addition to other similar problems.

We observe a significant proportion of non-compliant firms in Portugal (Table 2) because of the minor penalties (whenever they are specified) foreseen for non-compliant firms, which especially reflect a lack of appropriate inspection by the competent authorities. Our sample contains 10,395 firm-years that did not comply with the CA, out of which 3,360 did not even appoint the SA. Table 2 details how firms are distributed in terms of their failure status, together with the requirement for a CA and the appointment of an SA. Of the firms required to have a CA, a relatively higher proportion of failed firms do not comply with the CA requirement (31.9%) when compared to non-failed firms (6.8%). Likewise, a higher percentage of failed firms (11.5%) do not appoint an SA compared to non-failed firms (2.2%).

### *3.2. Empirical approach*

To assess the probability of bankruptcy, we use a logit model, widely used in the empirical literature on bankruptcy prediction (e.g., Campbell et al., 2008; Ohlson, 1980), including the strand that focuses on the relation between auditors' opinions and future financial distress (e.g., Altman et al., 2010; Cenciarelli et al., 2018; E. I. Altman & Sabato, 2007; Lennox & Kausar, 2017). Following previous studies, to isolate the potential incremental informational value inherent to the auditors' opinion, we control for the perception of bankruptcy risk already reflected in accounting and financial data, as well as other public information.

In our analysis, we conclude that, compared to other alternatives developed in line with previous research, the Informa D&B failure score outperforms them in terms of the predictiveness capability of bankruptcy risk. Such a score summarizes a whole set of public information, including financial data, as well as other non-financial variables, but does not weigh the audit opinions. The use of the failure score then allows us to compare two complementary sources of information available to creditors and investors. However, we note that the failure score is applied to all non-financial firms in Portugal if they have filed their accounts, and not only the ones required to have audited accounts. Therefore, we require that firms in our sample have been assessed by such a model, and we also retrieve the score together with the auditors' data.

The failure score ranges between 1 and 100, where 1 denotes maximum risk and 100 is minimum risk. For each currently non-failed firm, the failure score reflects the probability of such a firm having a failure event within the 12 months following the assessment. Although the model behind the failure score is a proprietary effort, Informa D&B discloses that the estimation of the

model uses explanatory variables mostly from public information, weighting four blocks of information: demographic, financial, negative information, and payment information. Accordingly, the failure score for firm $i$ at time $t$ ($FS_{it}$) depends on the data observed according to 19 variables and a set of related parameters, as follows

$$FS_{it} = f\left(Z_{1,i,t}, \ldots, Z_{19,i,t}, \theta\right) \tag{1}$$

where $f$ is a function of $\theta$, a vector of parameters, and $Z$, a vector of observations on the following 19 explanatory variables: business age, sector of activity, number of employees, type of legal form, geographical area, availability of financial data, age of balance sheet, solvency, net return on assets, retained earnings over assets, sales value, and taxes payable over sales, as well as the presence of negative equity and the existence of any execution process to pay debts, overdue tax debts, and any Special Revitalization Process, in addition to the weight of lawsuits relative to equity, value and age of pending lawsuits, and the average payment period computed from past trade experiences. Hence, auditing information is not included in Informa D&B's model.

Between 2011 and 2016, the accuracy of the failure score among the firms in our sample is given by an area under the receiver operating characteristic (ROC) curve (AUC) ranging between 0.81 and 0.85.[6] To assess the predictive ability of the failure score, we use as benchmarks the results provided by three models from previous related studies on bankruptcy prediction in SMEs, with the outcomes reported in Table 3.

We use the same model and similar variables as in Altman and Sabato (2007), as well as in Altman et al. (2010). For that purpose, we consider the following exogenous variables and ratios: cash/total assets (Cash_TA), earnings before interest, taxes, depreciation amortization (EBITDA)/total assets (EBITDA_TA), EBITDA/interest expenses (EBITDA_Int), retained earnings/total assets (Retain_TA), short term debt/book value of equity (STD_E), the natural logarithm of age, where age is the number of years since the beginning of activity (Log of age), a dummy for age (age $\in$ [3,9] = 1; otherwise = 0) (age 3–9 years), the natural logarithm of total assets (Size), and a dummy for negative EBITDA (negative EBITDA = 1; otherwise = 0) (Neg_EBITDA). Despite not being considered in Altman and Sabato (2007) nor Altman et al. (2010), we use the latter variable as an alternative to EBITDA_TA and EBITDA_Int, given the importance of a positive EBITDA for a firm to generate positive operational cash flow and thus be able to compensate its investors. We call this approach Altman et al. (2010) adapted.

The table shows that, based on the results for the Pseudo-$R^2$ and the AUC, the failure score excels the alternatives. Regarding comparable standards in the literature, the AUC for the failure score reveals a very high power of discrimination between bankrupt and non-bankrupt firms. For example, Altman et al. (2010) develop models to predict the bankruptcy of SMEs in the US and the UK, as the failure score does, and report values for the AUC between 0.75 and 0.80, below the value related to the failure score.

From the information disclosed by Informa D&B, we additionally report in Figure 1 the estimated contribution of the variables in the model, as reflected in their accuracy ratios (ARs).[7] Exhibiting the weight of the individual ARs relative to the model's total AR, i.e., when perfect independence between variables is assumed, the estimates in the figure reveal a spread contribution through the four blocks of information behind the failure score, despite a substantial contribution from negative information.

Given the high discriminatory power revealed by the failure score and considering that the underlying model mostly assesses public information—financial and other types—this score is taken as a reference for the accuracy provided by public information in predicting bankruptcy.

**Table 3. Comparison of alternative bankruptcy prediction models**

| Variables | Altman and Sabato (2007) | Altman et al. (2010) incomplete | Altman et al. (2010) adapted | Informa D&B's model |
|---|---|---|---|---|
| Cash_TA | -2.0107*** | -2.2078*** | -1.2560*** | |
| | (-2.99) | (-3.02) | (-3.91) | |
| EBITDA_TA | -0.0001*** | 0.0001* | | |
| | (-3.72) | (1.63) | | |
| EBITDA_Int | 0.0001* | 0.0000*** | | |
| | (1.81) | (-4.32) | | |
| Retain_TA | -0.0001 | -0.0001*** | -0.0001** | |
| | (-0.65) | (-2.83) | (-2.56) | |
| STD_E | 0.0000*** | -0.0001 | -0.0001 | |
| | (-4.34) | (-0.32) | (-0.77) | |
| Log of age | | 0.4823 | 0.5338*** | |
| | | (8.97) | (11.35) | |
| Age 3–9 years | | -0.0126 | -0.0835 | |
| | | (-0.1) | (-0.68) | |
| Size | | -0.1129*** | 0.0079 | |
| | | (-4.54) | (0.36) | |
| Neg_EBITDA | | | 2.3423*** | |
| | | | (24.23) | |
| Failure score | | | | -0.0428 |
| | | | | (-25.06)*** |
| Intercept | -5.1784*** | -5.6188*** | -8.0153*** | -3.5328 |
| | (-97.85) | (-23.71) | -32.45 | (-63.67)*** |
| Pseudo-$R^2$ | 0.0068 | 0.0194 | 0.1085 | 0.1177 |
| AUC | 0.6425 | 0.6537 | 0.7989 | 0.8290 |
| Likelihood ratio ?2 | 42.61 | 152.76 | 710.72 | 1,095.43 |
| Observations | 144,141 | 144,141 | 144,141 | 150,105 |

This table reports coefficients and z-values (in parentheses) from logistic regressions with robust standard errors. The dependent variable is a binary variable denoting failure events observed within 1 year. Altman et al. (2010) is not complete because not all variables are available for our sample. Significance at the 1%, 5%, and 10% levels are marked with ***, **, and *, respectively.

### *3.3. Model and variables*

As mentioned above, our main objective is to assess the informational value related to the different types of auditor opinions, the lack of opinion, or even the non-appointment of an auditor. Based on the completion of the information that companies provide in the IES's annual statements, we define seven categories of CA reports, ranked in ascending order per their severity level. Table 4 illustrates the distribution of the various types of auditors' disclosures in the CA reports.

The information in the table reveals that, in the case of both Big 4 auditors and others, most of the CAs are without reservation and emphasis, an opinion type reflecting minimum severity. We also observe that 23.23% of companies that ultimately failed obtained this type of classification from non-Big 4 auditors and 18.75% in the case of Big 4 auditors. These percentages confirm that most firms with a failure event within one year from the disclosure of the financial statements had previously been given signs of going concern problems.

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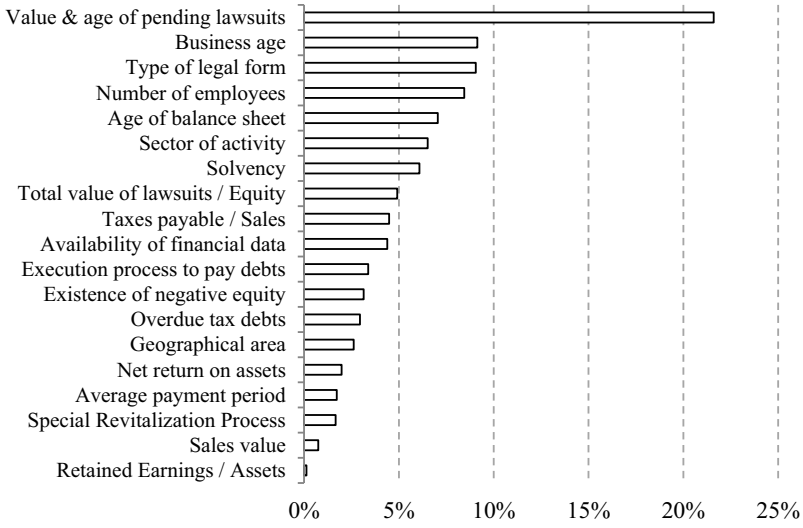


**Figure 1. Estimated contribution of explanatory variables to the global accuracy of the failure score.**

(Weight of the Individual ARs Relative to the Model's Total AR)

The CAs with emphasis have higher percentages in the CAs issued by Big 4 auditors (21.91%) in comparison to 13.5% by non-Big 4. Adverse opinions and disclaimers of opinion, both signalling more troubling information, exist in a small percentage of cases. In this instance, we do not find a big difference in frequencies for failed and non-failed firms, or when considering the size of the auditor. It is also important to note the high percentage of CAs non-issued, in the case of failed companies, especially when the auditor is a non-Big 4.

Thus, we test the hypotheses in this study by estimating the following bankruptcy prediction model, which controls for the public information already reflected in the failure score.

$$F_{it} = \frac{1}{1 + \exp\left[-\left(\alpha + \sum_{j=1}^{J} \beta_j \cdot X_{jit} + \delta \cdot FS_{it} + \varepsilon_{it}\right)\right]} \quad (2)$$

$F_{it}$ is a binary variable denoting failure (1 = failure; 0 = otherwise) for firm *i* up to one year after year *t*, $FS_{it}$ is the failure score for such firm at year *t*. The remaining exogenous variables, represented by $X_{jit}$, are binaries (1 = yes; 0 = no) for audit information, namely whether a firm: i) is audited with emphasis; ii) is audited with reservations; iii) is audited with reservation and emphasis; iv) is audited with an adverse opinion; v) is audited with a disclaimer of opinion and vi) when the CA has not been issued. Our estimation approach is similar to Lennox (1999), Geiger et al. (2005), Sun (2007), Altman et al. (2010), and Cenciarelli et al. (2018).

## 4. Results

### *4.1. Descriptive statistics*

When compared, the sub-samples of failed and non-failed firms (Table 5) show striking differences in the type of CA issued by auditors. Only an adverse opinion does not exhibit significant differences in means, which is explained by the rather low number of cases with this type of opinion. We also observe that future failed firms currently comply less with the required CA, and have lower percentages of no reservations and no reservations together with no emphases, but on the other hand show higher proportions of reservations, emphases, and disclaimers of opinion. The percentage of failed firms audited by a Big 4 auditor is also lower than observed for non-failed firms. Finally, the mean failure score is significantly lower in failed firms.

**Table 4. Distribution of the different certification of accounts with alternative disclosures (CA-Type), by auditor size and by failed and non-failed cases**

| | | Non-Big 4 | | | Big 4 | | |
|---|---|---|---|---|---|---|---|
| | **CA-Type** | **Non-failed** | **Failed** | **Sub-total** | **Non-failed** | **Failed** | **Sub-total** |
| 1 | Without reservations and | 84,283 | 144 | 84,427 | 12,028 | 6 | 12,034 |
| | without emphasis | 67.19% | 23.23% | 66.98% | 58.23% | 18.75% | 58.17% |
| 2 | With emphasis | 16,917 | 106 | 17,023 | 4,523 | 9 | 4,532 |
| | | 13.49% | 17.10% | 13.50% | 21.90% | 28.13% | 21.91% |
| 3 | With reservations | 10,631 | 83 | 10,714 | 1,716 | 3 | 1,719 |
| | | 8.48% | 13.39% | 8.50% | 8.31% | 9.38% | 8.31% |
| 4 | With reservations and | 6,854 | 125 | 6,979 | 1,823 | 10 | 1,833 |
| | with emphasis | 5.46% | 20.16% | 5.54% | 8.83% | 31.25% | 8.86% |
| 5 | With adverse opinion | 89 | 2 | 91 | 9 | 0 | 9 |
| | | 0.07% | 0.32% | 0.07% | 0.04% | 0% | 0.04% |
| 6 | With disclaimer of opinion | 277 | 14 | 291 | 58 | 0 | 58 |
| | | 0.22% | 2.26% | 0.23% | 0.28% | 0% | 0.28% |
| 7 | CA not issued | 6,385 | 146 | 6,531 | 500 | 4 | 504 |
| | | 5.09% | 23.55% | 5.18% | 2.42% | 12.50% | 2.44% |
| | **Total** | 125,436 | 620 | 126,056 | 20,657 | 32 | 20,689 |
| | | 100% | 100% | 100% | 100% | 100% | 100% |

To check for potential multicollinearity problems, we obtain the variance inflation factors (VIFs). Table 6 displays VIFs within acceptable levels, pointing to a low level of multicollinearity (below 10).[8] Table 7 shows pairwise correlations between variables, confirming the existence of low or not statistically significant values.

**Table 5. Descriptive statistics. The statistics are from the full sample of 150,105 firm-years**

| | Total | | Non-failed | | Failed | |
|---|---|---|---|---|---|---|
| **Variables** | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** | **Mean** | **Std. Dev.** |
| Without reservations and emphasis | 0.642 | 0.479 | 0.645 | 0.479 | 0.204 | 0.403 |
| With emphasis | 0.144 | 0.351 | 0.144 | 0.351 | 0.156 | 0.363 |
| With reservations | 0.083 | 0.276 | 0.083 | 0.275 | 0.117 | 0.321 |
| With reservations and with emphasis | 0.059 | 0.235 | 0.058 | 0.234 | 0.183 | 0.387 |
| With adverse opinion | 0.001 | 0.026 | 0.001 | 0.026 | 0.003 | 0.052 |
| With disclaimer of opinion | 0.002 | 0.048 | 0.002 | 0.047 | 0.019 | 0.137 |
| CA not issued | 0.069 | 0.254 | 0.068 | 0.252 | 0.319 | 0.466 |
| Failure score | 62.249 | 30.828 | 62.467 | 30.715 | 24.075 | 24.928 |

**Table 6. Variance inflation factors**

| Variable | VIF |
|---|---|
| With emphasis | 1.06 |
| With reservations | 1.04 |
| With reservations and with emphasis | 1.06 |
| With adverse opinion | 1.00 |
| With disclaimer of opinion | 1.00 |
| CA not issued | 1.05 |
| Failure score | 1.06 |

### *4.2. Regression estimates*

From the results in Table 8, we confirm that the issuance of reservations, emphases, and disclaimers of opinion signal a higher probability of failure, although in quite different ways; this evidence supports hypothesis H1. The coefficients for all the independent variables are positive and statistically relevant. However, contrary to Altman et al. (2010), the evidence we obtain also confirms disparate influences from the different opinion types, with the more severe opinions showing higher coefficients. Using a clean CA report (without emphasis or reservations) as a reference, the results in the table show that, for the same failure score, the odds of a firm with emphasis becoming failed are estimated to be approximately 2.3 times higher. For firms with the same failure score, those with a reservation have odds of becoming failed three times as high as those who do not have any reservation or emphasis. Concerning the opinions expected to express higher severity, we observe that similarly, when compared to a clean CA report, firms with an adverse opinion or with a disclaimer of opinion show even greater odds of becoming failed, approximately 7.2 and 13.2 times higher, respectively.

Our results, therefore, reveal that a disclaimer of opinion stands out with the highest coefficient and the closest relation to future failure events, suggesting that stronger signs of an impending business failure exist when auditors refrain from expressing opinions. This opinion type is expected to reflect misstatements in the financial statements, both material and pervasive, wherein insufficient financial information has been handed to the auditor. The financial opacity the auditor finds most probably indicates that the audited firm is trying to conceal some negative facts that could compromise its prospects if exposed in the audit.

Despite the scope limitation underlying most cases with a disclaimer of opinion, we also do not exclude the possibility that, in the face of signs of financial distress, auditors opt for a disclaimer of opinion to avoid undermining their relationship with the audited firm without threatening their credibility. The issue of independence in audit opinions has inclusively been already analysed in previous research. For example, Basioudis et al. (2008) find a negative relationship between the level of non-audit service fees and GCOs, and thus do not rule out the hypothesis of impaired auditor independence. Another confirmation that impaired auditors are reporting decisions is provided by Blay and Geiger (2013), who detect that significantly fewer GCOs are issued to firms that pay higher total fees in subsequent years.

The non-issuance of a CA—which denotes firms that either have not appointed an auditor or, if they have appointed one, the auditor has not issued the CA report—is also related to a very high odds ratio (8.4). In line with our expectation, such non-compliance with the CA tends to reveal financial problems ahead, thus sustaining hypothesis H2.

The literature has extended the effect of auditor size to the case of mid-tier auditors (e.g., Berglund et al., 2018), such as Grant Thornton and BDO Seidman. Accordingly, to capture the effect of auditor size, we subdivide our sample into three sub-samples, one with clients of the Big 4

**Table 7. Pairwise correlations**

| | | Failure s. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | Failure score | 1 | | | | | | | |
| 1 | Without reservations and emphasis | 0.216*** | 1 | | | | | | |
| 2 | With emphasis | −0.084*** | −0.230*** | 1 | | | | | |
| 3 | With reservations | −0.049*** | −0.170*** | −0.068*** | 1 | | | | |
| 4 | With reservations and with emphasis | −0.141*** | −0.143*** | −0.057*** | −0.042*** | 1 | | | |
| 5 | With adverse opinion | −0.010*** | −0.016*** | −0.006*** | −0.005** | −0.004** | 1 | | |
| 6 | With disclaimer of opinion | −0.024*** | −0.030*** | −0.012*** | −0.009*** | −0.007*** | −0.001 | 1 | |
| 7 | CA not issued | −0.103*** | −0.163*** | −0.065*** | −0.048*** | −0.040*** | −0.004** | −0.009*** | 1 |

Significance at the 1%, 5%, and 10% levels are marked with ***, **, and *, respectively.

**Table 8. Estimates for Eq. (2)**

| Variables | Coefficient | Odds ratio |
|---|---|---|
| Failure score | -0.036*** | 0.965 |
| | (-21.97) | |
| With emphasis | 0.852*** | 2.344 |
| | (6.81) | |
| With reservations | 1.125*** | 3.081 |
| | (8.23) | |
| With reservations and with emphasis | 1.577*** | 4.840 |
| | (12.88) | |
| With adverse opinion | 1.967*** | 7.150 |
| | (2.71) | |
| With disclaimer of opinion | 2.579*** | 13.178 |
| | (8.93) | |
| CA not issued | 2.127*** | 8.388 |
| | (20.11) | |
| Intercept | -4.663*** | 0.009 |
| | (-48.03) | |
| Pseudo-$R^2$ | 0.1674 | |
| AUC | 0.8595 | |
| Likelihood ratio ?2 | 1,557.93 | |
| Observations | 150,105 | |

This table reports coefficients and z-values (in parentheses) from logistic regressions with robust standard errors. The dependent variable is a binary denoting failure events within 1 year after the failure score and the auditor's assessment. Significance at the 1%, 5%, and 10% levels are marked with ***, **, and *, respectively. The coefficients are converted to the respective odds ratio.

auditors, another with those of mid-tier auditors, and one more with those of the other auditors (small auditors). We define mid-tier auditors as the four biggest auditors after the Big 4, in terms of the number of clients in the last year of our data. As seen from the number of observations in Table 9, in our sample the mid-tier auditors hold a market size close to 50% of that of the Big 4.

When we re-estimate Equation 2 in the three sub-samples, the results reveal some important differences (Table 9). Using again a clean CA as a reference in each sub-sample, we detect that for firms with the same failure score, those with an emphasis have odds of becoming failed that are almost 3.4 times higher in the case of Big 4 clients, greater than the odds of 2.4 times higher for the clients of small auditors. The difference is even greater for a CA with reservations and with emphasis, with the odds almost doubling in Big 4 clients compared to those observed in clients of small auditors. The odds of clients of mid-tier auditors fall in between those of the other two firm groups. Similar evidence for the relation between the odds of the different firm groups exists in the non-issuance of a CA. The odds ratios for adverse opinions and disclaimers of opinion are significantly high in clients of small auditors, but in the other two groups of firms, these types of opinions predict failure perfectly.

The previous results generally suggest that Big 4 auditors are stricter in pointing out the contingencies that jeopardize the continuity of the company, by highlighting the errors, omissions, and divergences found in the company accounts, which are correlated with the failure risk. Mid-tier auditors appear in an intermediate position between the Big 4 and the small auditors, confirming that auditor size is relevant in terms of information value.

**Table 9.** *Estimates for* **Equation 2**

| | Small auditor | | Mid-tier auditor | | Big 4 | |
|---|---|---|---|---|---|---|
| **Variables** | **Coef.** | **OR** | **Coef.** | **OR** | **Coef.** | **OR** |
| Failure score | -0.038*** | 0.963 | -0.030*** | 0.971 | -0.019*** | 0.981 |
| | (-21.12) | | (-4.89) | | (-3.09) | |
| With emphasis | 0.872*** | 2.392 | 1.090** | 2.974 | 1.235** | 3.438 |
| | (6.48) | | (2.16) | | (2.39) | |
| With reservations | 1.075*** | 2.929 | 1.529*** | 4.614 | 1.152* | 3.165 |
| | (7.37) | | (2.92) | | (1.63) | |
| With reservations and with emphasis | 1.557*** | 4.747 | 1.904*** | 6.712 | 2.109*** | 8.243 |
| | (11.87) | | (3.87) | | (4.06) | |
| With adverse opinion [(1)] | 1.927*** | 6.871 | 0.000 | 1.000 | 0.000 | 1.000 |
| | (2.63) | | (omitted) | | (omitted) | |
| With disclaimer of opinion [(2)] | 2.771*** | 15.975 | 0.000 | 1.000 | 0.000 | 1.000 |
| | (9.83) | | (omitted) | | (omitted) | |
| CA not issued | 1.987*** | 7.292 | 2.423*** | 11.280 | 2.670*** | 14.437 |
| | (17.76) | | (5.42) | | (4.19) | |
| Intercept | -4.460*** | 0.012 | -5.166*** | 0.006 | -6.550*** | 0.001 |
| | (-43.30) | | (-11.98) | | (-14.51) | |
| | | | | | | |
| Pseudo-$R^2$ | 0.1751 | | 0.1556 | | 0.087 | |
| AUC | 0.865 | | 0.859 | | 0.784 | |
| Likelihood ratio ?2 | 981.01 | | 75.95 | | 33.49 | |
| Observations | 118,087 | | 11,304 | | 20,622 | |

Mid-tier auditors are the 4 biggest ones after the Big 4. This table reports coefficients and z-values (in parentheses) from logistic regressions with robust standard errors. The dependent variable is a binary denoting failure events within 1 year after the failure score and the auditor's assessment. Significance at the 1%, 5%, and 10% levels are marked with ***, **, and *, respectively. The coefficients are converted to the respective odds ratio (denoted as OR).



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We additionally conduct robustness checks of results by running alternative regressions. Accordingly, we control for the audited firm size, given previous findings (Berglund et al., 2018) that larger firms more frequently hire Big 4 auditors than smaller firms, which is partly explained by the higher fees applied by Big 4 auditors compared to other auditors (Foster & Shastri, 2016). We also test the potential effects on parameters due to the representativeness of failed firms relative to the financial year 2011, which reflects the tough economic situation in Portugal at the time. Finally, we perform a robustness check on the significance and relevance of the distinct auditors' opinions by focusing only on firms with very high risk. Overall, the results we obtain (not reported) reveal that the marginal influences per opinion type remain robust to these changes.

Auditors' opinions for each fiscal year are expected to reflect the relevant evidence the auditor assesses in that particular year, which may include past events; however, auditor opinions should not be restricted by opinions in previous years. To check whether each opinion type is highly affected by opinions in consecutive years, we compute the respective correlations. The results we obtain show differences depending on the periods and opinion types, with the highest correlation (0.7) being observed for opinions without reservations and emphasis at the height of the economic crisis in Portugal, in 2013. Regarding the adverse opinion and the disclaimer of opinion, the average correlation for consecutive years is near 0.33; given these moderate results, we consider that this issue does not influence our results.

The previous results confirm that the annual finance reports as well as CA are meaningful instruments that can reduce the information asymmetry between managers and investors. The content of the audit reports and the comments of the auditors are fundamental to assess the credibility of the company's reports and conclude about its financial situation. Both managers and auditors are aware of this, despite their different concerns and interests. Under a positive financial situation, managers have the incentive to support auditors in disclosing a timely clean certification. Conversely, an adverse financial situation tends to exacerbate the potential divergent positions of managers and auditors. In the latter case, managers have an interest in delaying the information for stakeholders, but auditors take considerable risks by not reporting the bad news in any way to investors. In extreme situations, they may prefer not to issue the certification. Alternatively, to mitigate the error associated with false positives, they may progressively introduce more and more negative comments so that investors are alerted. In the case of small auditors, which more easily tend to establish personal relationships with managers, there may be a higher tendency to delay signalling the bad news on the company's financial situation.

Hence, regardless of the audit opinion type, our results provide compelling evidence of the informational value contained in the auditor's GCO to predict future failure events. Such evidence reinforces findings in previous research (e.g., Altman et al., 2010; Cenciarelli et al., 2018; Hopwood et al., 1994; Senteney et al., 2006) that auditors' opinions increase the accuracy of models predicting bankruptcy. Our research confirms that such accuracy may improve when the effects of the distinct opinion types are accounted for.

## 5. Concluding remarks

This paper reports empirical evidence on the incremental value provided by auditing information and auditors GCOs in signalling the risk of impending bankruptcy. Using data from Portuguese audited firms included in the Informa D&B database, spanning from 2011 to 2016, our results show that auditing details contain relevant insights in addition to the public information already contained in a model of bankruptcy forecasting. The signalling that firms communicate in whether they comply with the CA provided by an auditor, in addition to the auditor size, as well as the privileged information that auditors obtain about the firm's actual financial condition, emerge as powerful predictors of bankruptcy. These findings complement the evidence from other countries, mostly the UK and US, reported in previous literature.

For investors and other stakeholders, we have shown that an emphasis, a reservation, a reservation with emphasis, and other types of opinions are correlated with different levels of failure risk. For example, when comparing firms with a reservation and with emphasis, given the same rating score, the odds of becoming failed are estimated to be about five times as high as those of firms that have a clean CA. Firms with a disclaimer of opinion and those who do not deliver the audit report also show odds of becoming failed 13 and 8 times as high as those of firms without emphasis or without reservations. Our results also exhibit evidence of higher odds in firms audited by a Big 4 and with a negative opinion than in non-Big 4 CA, especially when compared to clients of small auditors.

For policymakers, the results of this study and the significance of auditor opinions highlight the importance of effective oversight for both auditors and audited firms. In addition, by signalling a noteworthy reduction in companies' financial opacity due to auditing, our findings suggest the conceivable advantages of reducing the audit exemption threshold to increase the number of audited firms. For the auditors themselves, these outcomes convey knowledge about how their different opinions are related to the future situation of the audited firms and, thus, reduce their uncertainty in predicting bankruptcy (Lennox & Kausar, 2017).

As we lack detailed information regarding the content of each audit report, we cannot say whether a reservation or another qualified opinion indeed represents a GCO, which we acknowledge as a potential limitation in our study. Such an aspect reflects the way reporting rules are defined in Portugal. Another specificity in our dataset is that legal processes (including bankruptcy) in Portugal are rather slow, which somewhat explains the relatively low number of failures in the 12 months after GCOs have been issued (some failures occur later).

We confirm that most of the audited firms that became bankrupt in the year following their reporting had previously been given a reservation, an adverse opinion, a disclaimer of opinion, an emphasis, or other appropriate warnings from the auditors. Even so, a significant percentage of opinions are not clear or are non-incisive as to the going concern of the firm that went bankrupt the following year; this is an issue that should be improved in the auditors' reports. The identification of the factors underlying the accuracy of auditors' opinions is an issue requiring further research. Such analysis is needed to guide the decrease of the high false positive rate implied in the modified opinions without jeopardizing sensitivity.

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**Notes**
1. As underlined by Alexeyeva and Sundgren (2021), who investigate a sample of Swedish private companies, most previous studies on the informational value of going concern are based on evidence from Anglo-Saxon public companies.
2. According to data from the World Bank, the percentage of listed firms in Portugal (near 0.013% of the total number of firms as of 2018) is circa one tenth of the average percentage registered in the USA and the European Union.
3. Only after 2016, in the context of the new European audit legislation, did Portugal include the statutory audit oversight within an existing and independent regulatory body—the Portuguese Securities Market Commission (CMVM), the capital market oversight body.

4. The Informação Empresarial Simplificada (IES) is an annual statement that all companies and entrepreneurs with organized accounting in Portugal are required to file to fulfil their tax, accounting, and statistical obligations.
5. The model behind this score was developed in line with major related references, particularly, Ohlson (1980) and Shumway (2001), and has been certified by Dun & Bradstreet International, Informa D&B's international partner.
6. The ROC curve graphically depicts the relation between the proportion of correctly predicted cases as failed (true positives, or sensitivity) and the proportion of incorrectly predicted cases (false positives, or 1-specificity). The area under the ROC curve is a benchmark for assessing the ability of a forecasting model to accurately discriminate firms in terms of their bankruptcy risk. The closer the area of the ROC curve is to 1, the higher the discriminatory power of the model and consequently the more accurate the model.
7. The AR is directly related to the AUC, as follows: $AR = 2 \times AUC - 1$.
8. A detailed discussion of appropriate VIF levels is presented byO'Brien (2007).

**Disclosure statement**

No potential conflict of interest was reported by the author(s).

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