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Explaining the causes of business failure using audit report disclosures

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ABSTRACT

This paper examines the ability of audit report disclosures to explain the causes of business failure. Despite incremental interest in organizational failure, much of the existing literature has used accounting ratios to foresee why firms fail. We hypothesise that the audit report can also be employed for this purpose because it provides information regarding any material uncertainty relating to events that may warn users about possible causes of business default. Using a matched sample of 808 failed and non-failed firms, our results suggest that audit report disclosures significantly explain the causes of business failure. Moreover, these findings are consistent with the results of studies that integrate both deterministic and voluntaristic perspectives into the examination of the antecedents of organizational failure, as disclosures about both external and internal factors are mentioned in the audit report and contribute to assessing default. Managers, auditors, regulators and other users may consider the audit report to be useful as a tool to anticipate business failure.

1. Introduction

During past decades, researchers from multiple social science disciplines, including accounting, finance, strategy and organizational studies, have studied the topic of business failure,¹ as well as its causes and its consequences (Lukason, 2016; Mellahi & Wilkinson, 2004). Despite the number of studies of the causes of business failure, there is a need to improve the integration of this stream of research across social science disciplines (Amankwah-Amoah, 2016). For instance, to date, scholars have apparently ignored the intersection between the causes of business failure and the discipline of auditing.

This paper addresses the question of whether causes of business failure are explained in audit report disclosures,² that is, whether external auditors can anticipate the reasons for a firm failing immediately before it occurs. As the process of failure may take up to 5–6 years, “it is not a sudden phenomenon” (Korol, 2013, p. 22). Therefore, auditors

could detect the earlier warning signals of a firm's crisis, and users of the audit report could be prepared to react in subsequent phases.

In a letter to the firm's shareholders, the auditors present the results of the auditing process in a report. The audit report is in writing, identifies the firm whose annual financial statements are analysed, and specifies the financial reporting framework applied and the period covered in those statements. This document includes an audit opinion, which can be either unqualified, qualified or an adverse opinion, and states clearly the opinion of the auditor as to whether the annual financial statements gives a true and fair view³ in accordance with the relevant framework and, where appropriate, whether the annual financial statements comply with statutory requirements. If the auditor is unable to express an audit opinion, the report will contain a disclaimer of opinion. Additionally, the report should refer to any other matters to which the auditor draws attention by way of emphasis without qualifying the audit opinion. Additionally, the report provides a statement

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¹ In this paper, we consider business failure to occur when a company files for insolvency proceedings, as in the prior literature (Lizarraga-Dallo, 1998; Piñeiro-Sánchez, de Llano-Monelos, & Rodríguez-López, 2013; Zorn, Norman, Butler, & Bhussar, 2017), indicating that it is the moment when a firm becomes financially distressed or insolvent and cannot meet its financial obligations.

² When we refer to disclosures in the audit report, we include the qualitative information incorporated into the emphasis and qualification paragraphs. Thus, we consider both unqualified and qualified opinions in the sample because an emphasis paragraph does not qualify the opinion. Emphasis paragraphs indicate a significant uncertainty or any other matter that has been disclosed appropriately in the notes to the financial statements.

³ In accounting and auditing, the term “true and fair view” indicates that the financial statements are free from material misstatements and that they faithfully represent the financial performance and position of the entity.

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on any material uncertainty relating to events or conditions that may cast significant doubt about the firm's ability to continue as a going concern. The going concern is a common qualification generally issued when a firm's financial viability is in doubt.

Auditing standards specify that the auditors' responsibility is to evaluate the going concern uncertainty (Pedrosa & López-Corrales, 2018). Thus, auditors are required to mention any evidence found during the audit processes regarding the risk of failure and to qualify their audit reports if the risk remains high after the conclusion of the audit (McKee, 2003). Therefore, the audit report can be used as an early warning of impending failure (Casterella, Lewis, & Walker, 2000). Courts, investors and analysts rely on this document to evaluate firms in financial distress (Geiger, Raghunandan, & Rama, 2005; Kim, Kim, & McNeil, 2008; Lennox, 1999). As failed firms' stakeholders must be aware of going concern risks when making decisions, it seems reasonable that auditors, financial advisors and even the business press should have an obligation to report failure risks to stakeholders (Van Peurseem & Chan, 2014).

However, some users are dissatisfied with the auditing profession's ability to warn the public of imminent failures. This feeling was specifically salient during the global financial crisis, when users complained that auditors did not caution adequately in their reports about impending bankruptcies (Geiger, Raghunandan, & Riccardi, 2014; Sikka, 2009). Nevertheless, in the majority of cases, auditors issued qualifications when the risk of insolvency existed, supporting the role of auditors and their responsibility during the crisis (Tagesson & Öhman, 2015; Xu, Carson, Fargher, & Jiang, 2013).

We expect that in their reports, auditors provide some insights that explain failure (Kim et al., 2008), giving credence to the contribution of their assessments (Van Peurseem & Chan, 2014). More precisely, to add to this line of inquiry, we theorise that the content in the audit report may provide significant explanatory power to illustrate the causes of business failure. To the best of our knowledge, the explicit content of the audit report has not yet been used to explain the causes of business failure (Piñero-Sánchez, de Llano-Monelos, & Rodríguez-López, 2012).

Further, to explain the causes of business failure, the current research is polarised between the deterministic and voluntaristic perspectives. While proponents of the deterministic theory agree that the causes are mainly external, such as industry-specific and environmental factors, researchers who propose the voluntaristic theory point to internal facts to explain failures, such as facts related to general management skills or financial management control. To shed some light on this debate, our research analyses all the causes of business failure, as auditors remark both internal and external circumstances. We add evidence to the business failure core studies, which recommend the examination of a combination of exogenous and endogenous causes for a more powerful explanation (Amankwah-Amoah, 2016; Carter & Van Auken, 2006).

To test our expectations, we use a sample of 404 failed firms that filed for bankruptcy during the period of 2004–2014 and a matched sample of 404 non-failed firms. The primary findings of this study suggest that disclosures in the audit report can explain, with an accuracy of approximately 80%, the causes of business failure. Most notably, the same pattern holds using three different methodologies: a traditional methodology (logit) and two artificial intelligence methodologies (rough set and C4.5 algorithm). In addition, when segregating audit report disclosures between external and internal circumstances, our evidence shows that the interrelation of both external and internal causes contributes to explaining failure more robustly than either cause does in isolation.

First, we contribute to the calls from past studies for a more integrated discussion of the causes of business failure (Amankwah-Amoah, 2016; Lukason & Hoffman, 2014; Trahms, Ndofor, & Sirmon, 2013). Second, we shed light on prior research on the need for studies regarding what auditors are evaluating in terms of financial statement items and in terms of client contrary and mitigating factors that may

cast substantial doubt and may lead to going concern assessments (Carson et al., 2013). Third, per our review, this study is the first that uses audit report disclosures to explain causes of business failure. Fourth, for top managers, we provide evidence that the audit report can be considered a useful, accessible and easy-to-analyse tool to explain causes of business failures, and with respect to uncertainty, the audit report displays specific causes that can be carefully considered in decision-making processes (for example, asset valuation and going concern, among others). Finally, regulators might also benefit from this study because it is timely and relevant in the current international auditing environment, in which regulatory changes are occurring worldwide, increasing the auditors' transparency through audit reports.

The remainder of the paper is organised as follows. The next section reviews the relevant literature on explanations regarding using audit data to identify the causes of business failure. Then, the sample, variables and methodology of this work are described. In the fourth section, the results are analysed and discussed, adding some robustness tests to ensure the viability of our findings. The conclusion appears in the last section.

2. Review of literature and research hypotheses

2.1. Business failure and audit

Audit quality is essential to ensure the reliability of the financial information provided to stakeholders for making faithful decisions (Gaynor, Kelton, Mercer, & Yohn, 2016). In this sense, auditors are required to disclose in the report a statement on any material uncertainty related to conditions that might cause significant doubt about the firm's ability to continue in the foreseeable future. They may qualify their opinions if the likelihood of failure is high during the one-year period following the issuance of the report (McKee, 2003).

Prior literature points to the auditing profession's ability to warn investors about upcoming failures, suggesting that investors perceive audit reports as informative (Dopuch, Holthausen, & Leftwich, 1987; Piñero-Sánchez et al., 2013). Similarly, other studies on business failure emphasise that audit opinions provide explanatory power for anticipating bankruptcy (Altman, Sabato, & Wilson, 2010; Kim et al., 2008). Indeed, during the global financial crisis, there is evidence that supports the fact that auditors made the right decisions when issuing qualified opinions to financially distressed companies (Xu et al., 2013; Xu, Jiang, Fargher, & Carson, 2011).

However, the identification of business failure is complex, diverse and hard to detect (Lukason, 2016). During the global financial crisis, auditors did not warn about some business failures on their reports. In those corporate scandals, stakeholders were dissatisfied because the firms failed and had to seek financial support within a short period after receiving an unqualified opinion (Sikka, 2009). Although the role of auditors was questioned after these cases, the issue of unqualified auditing opinions could be due to several reasons. A qualified opinion could have resulted in the following: it could have accelerated a struggling company's demise; it could have also persuaded those firms to shut off customers' credit lines (Casterella et al., 2000); or it could have damaged the audit firms' reputation and increased the audit firms' litigation risk (Pedrosa & López-Corrales, 2018). After the crisis, the propensity to issue going concern qualified opinions prior to failure increased significantly (Geiger et al., 2014) and, in the literature, there is evidence regarding the association between audit quality, business failure and qualified reports (Arnedo-Ajona, Lizarraga-Dallo, & Sánchez-Alegría, 2012; Blay, 2005).

In the body of business failure research, accounting ratios have been the most frequently used variables for explaining business failure (Altman, Iwanicz-Drozowska, Laitinen, & Suvas, 2017). Nevertheless, ratios do not embody all symptoms of financial failure and, for this reason, they can sometimes be well replaced by other types of variables, such as macroeconomic data (Hernández-Tinoco & Wilson, 2013),

market variables (Hillegeist, Keating, Cram, & Lundstedt, 2004), or non-financial information (Laitinen, 2013; Laitinen & Laitinen, 2009; Lussier, 1995). Non-financial data might refer to variables that represent dimensions of the firms' management (Du Jardin, 2017). Firm size and industry are other non-financial dimensions commonly used when assessing failure (Altman et al., 2010; Back, 2005; Cultrera & Brédart, 2016; Hopwood, McKeown, & Mutchler, 1989; Laitinen, 1999; Lensberg, Eilifsen, & McKee, 2006). Additionally, regarding other data apart from financial ratios used to explain business failure, there has been some evidence of the usage of audit variables (Altman et al., 2010; Hopwood et al., 1989).

To organise and narrow the prior literature on the integration between the social science discipline of auditing and business failure, we have conducted a systematic review of literature. We compiled all academic papers from the ISI Web of Knowledge database as of October 2016, according to two keywords: “audit” and “bankruptcy”. The preliminary search identified many papers focused on the broad areas of failure. The process of reading the abstracts and introductions of the articles led to further elimination of studies outside the scope. After filtering the results, only seven of these papers connected the explanation of business failure with the field of auditing. Thus, a summary of these articles appears in Table 1, explaining their samples, methodologies, audit variables used, and key findings.

Casterella et al. (2000) use audit data for explaining why a business fails. Using auditors' tenure and time lags, such as the months between the audit report date and the fiscal year-end or the months between the report and the bankruptcy filing, they conclude that auditors are not able to justify court proceedings. Nevertheless, they show that auditors might detect the worst cases easily, giving qualified opinions to firms in debt default and whose financial prospects are highly uncertain. Healthier firms that do not exhibit relevant distress flags will end up with unqualified opinions.

In the remaining papers found in the review of research, there seems to be more consensus on the accuracy of auditing information to explain the failure or survival of firms. According to McKee (2003), the audit opinion as an independent variable in rough set modelling methodology does not provide significant comparative advantage regarding accuracy over the auditors' methodologies. Thus, the auditors' ability to explain business failure is comparable to that of an artificial intelligence method. Van Peurseem and Chan (2014) agree with the idea that differences between failed and non-failed firms might be detected using a combination of accounting ratios and audit data. Other authors claim that audit information, such as the type of audit opinion, the accumulation of qualified opinions or a high auditor rotation, contributes to assessing failure (Altman et al., 2010; Kim et al., 2008; Piñero-Sánchez et al., 2012, 2013). Concretely, Kim et al. (2008) conclude that the audit opinion and the firm's risk and size can accurately anticipate the survival prospects of failed firms. According to Altman et al. (2010), the fact that a company has been audited is already indicative of higher accuracy in identifying failure. Moreover, the creditors' legal actions, the company's filing histories, comprehensive audit reports and audit opinions contribute to increasing the explanation of risk models used for the assessments of SMEs.

2.2. Research hypotheses

When any company releases the audit report, this document indicates a professional opinion regarding the reliability and completeness of the firm's financial information and disclosures (Lennox, 1999). Many authors have claimed that the audit opinion has informational value in the assessment of business failure (Feldmann & Read, 2013; Hopwood et al., 1989; Kim et al., 2008). Because the auditors' responsibility is “to ensure that the financial statements give a true and fair view of the financial performance of the firm” (Laitinen & Laitinen, 2009), auditors must qualify their opinion if this view is not provided, explaining the causes of this matter in the audit report. Thus, the past

literature suggested that qualified opinions contribute significantly to anticipating failure (Chen, Gupta, & Senteney, 2004; Hopwood et al., 1989; Keasey & Watson, 1987; McKee, 2003; Van Peurseem & Chan, 2014).

To issue their opinions, auditors are charged with the responsibility to evaluate the going concern status of every firm as part of the audit, and they must decide whether the firm will remain in business over the coming year (Casterella et al., 2000). In such cases in which a substantial doubt exists about the firm's survival, auditors would mention this viability risk in a going concern qualification (Blay, Geiger, & North, 2011; ISA 570; SAS No. 59). This qualification seems to be a key dimension in explaining the causes of failure (Altman et al., 2010).

Along with the above, if the audit report is the only mechanism for auditors to communicate any risks of business failure to all interested outside parties, the reasons that caused failure might be disclosed in the report. Going concern uncertainties are linked to business failure, and other causes contained in the qualified reports also represent signals of viability concerns. Consequently, if there is a relationship between the causes of business failure and the disclosures included in the audit report, the inclusion of these disclosures as explanatory variables in models used to assess business failure could improve the explanatory power and accuracy of these models and show the reasons that are causing the failure. As we have seen, there is some literature on how the type of audit opinion, namely, unqualified and qualified opinions, explains the failure. However, according to our knowledge, the content of the comments or the reasons behind these opinions that auditors include to explain the causes and justify their opinions have not yet been explored. Therefore, it remains unknown whether disclosures in the audit report might accurately shed light on the causes of business failure. Our study extends earlier research in this area by assessing the ability of disclosures in the audit report to explain possible causes of business failure. In particular, we refer here to comments disclosed in unqualified opinions, unqualified opinions with emphasis paragraphs, and qualified opinions.

Casterella, Lewis, and Walker (1999) theorised that auditors issue qualified opinions for soon-to-be bankrupt companies that are financially distressed and that exhibit many distress flags. Following this reasoning, it is rational to believe that indicators of the causes of business failure should be included in the audit report disclosures of failed firms that are close to filing for bankruptcy and that, on average, are highly leveraged and have low profitability. Accordingly, we propose the first hypothesis.

Hypothesis 1. Disclosures in the audit report are significant in explaining the causes of business failure.

We expect that comments included in the audit report could be informative and might contribute to explaining possible causes of business failure. The process of gathering information about the causes of business failure in the audit report is challenging and more complicated than the use of accounting ratios with the same purpose. Traditionally, failure causes were obtained from managers'/owners' interviews, from trustees' questionnaires or even from the additional data from court judgements. However, these sources of information have limitations and are difficult to access (Lukason, 2016). The novelty of our research is the usage of a different perspective, that is, the auditors' visions of failed firms and what the auditors write about these failed firms in their reports. Presuming that auditors are independent and that their obligation is to provide information in the audit report on any risks and uncertainties in the firm's viability, the content of the audit reports of failed firms might be considered a good source to search for an explanation for the causes of business failure.

The prior literature has emphasised that “firm failure causes suffer from a lack of theoretical consensus” (Lukason, 2016, p. 11). Recently, the research on the antecedents of business failure has tended to be polarised between the deterministic and voluntaristic perspectives (Amankwah-Amoah, 2016). Under classical industrial organization (IO)

Table 1
Prior literature on the causes of business failure and audit data.

Authors/year	Sample	Methodology	No. of audit variables	Explanation of audit variables	Key findings
Casterella et al. (2000)	US/100 public bankrupt firms/1982–1992	Multivariate test (logit)	3	Audit tenure, months between the fiscal year-end and the audit report date, months between the audit report date and the bankruptcy filing date	Auditors do not appear to be able to anticipate either bankruptcy filings or resolutions
McKee (2003)	US/146 bankrupt and 145 non-bankrupt public firms/1991–1997	Artificial intelligence (rough sets)	1	Audit opinion (qualified, unqualified with emphasis, and disclaimer of opinion)	Rough set models do not provide significant comparative advantage regarding classification accuracy over auditors' methodologies
Kim et al. (2008)	Republic of Korea/35 firms that recovered from financial distress and 24 non-recovered/1991–2003	Multivariate test (logit)	1	Audit opinion (unqualified or qualified)	Audit opinion, client risk and client size accurately explain the survival prospects of failed firms
Altman et al. (2010)	UK/5.8 million SMEs, of which 66,000 failed/2000–2007	Multivariate test (logit)	3	Firm is audited or not, going concern qualification, severe audit qualification (severe adverse opinion or disclaimer of opinion)	Creditors' legal actions, company filing histories, comprehensive audit reports and audit opinions contribute to the assessment of failure in risk models for SMEs
Piñeiro-Sánchez et al. (2012)	Galicia (Spain)/101 distressed and 101 non-distressed private firms/1998–2008	Multivariate test (logit)	8	Auditors' rotation, audit tenure, number of stakeholders, proportion of qualified reports, number of qualified reports by auditor, number of critical reports, qualification due to accounting principles violated, change in auditor's size	The accumulation of qualified opinions and high auditor rotation rates are reliable measures of credit risk and bankruptcy
Piñeiro-Sánchez et al. (2013)	Galicia (Spain)/98 distressed private firms/1998–2008	Multivariate test (logit)	9	Proportion of audited years, auditors' rotation, temporal matches between auditor changes and changes in the opinion, audit tenure, ratio between qualified and total audit reports, number of critical reports, auditor size, obstructionism, non-compliance with mandatory audit	High auditors' rotation, qualified reports and non-compliance with deadlines of financial statements' publication are accurate indicators of business failure
Van Peurseem and Chan (2014)	New Zealand/25 failed and 25 non-failed public firms/2001–2010	Univariate analysis	2	Audit firm and audit qualifications	There are significant differences between failed and non-failed firms that can be detected using financial ratios and audit data

This table reports, by chronological order, the seven studies, which were found in the review of research from the ISI Web of Knowledge database as of October 2016, that explain business failure using audit data. The first column contains the authors and year of each publication. In the second column, the country, the type of firms, and the years of the samples are displayed. The methodology used in each study is disclosed in the third column. Columns four and five detail the number and explanation of the audit variables, and the results per study are synthesized in the last column.

and organization ecology (OE), proponents of the deterministic theory argue that causes of business failure are external. A company fails due to industry-specific and environmental factors, and managers cannot influence the firm's destiny (Mellahi & Wilkinson, 2004). For instance, external causes comprise general external development and specific external development “outside forces” (Laitinen & Lukason, 2014).

However, other studies have pointed to internal causes of business failure. This stream of research has appeared in organizational studies (OS) and organizational psychology (OP), anchored in the voluntaristic theory. This line suggests that managers' actions and decisions are the fundamental causes of business failure (Amankwah-Amoah, 2016; Mellahi & Wilkinson, 2004). Internal causes are, for example, general management skills, financial management and control, and operations management. Moreover, there is also a line of research on the causes of business failure that recommends using a combination of exogenous and endogenous causes for a more powerful explanation (Amankwah-Amoah, 2016; Carter & Van Auken, 2006).

In addition, some authors have related the internal and external causes of business failure to the process of failure itself. Recently, Laitinen, Lukason, and Suvas (2014) and Lukason (2016) claimed that the process is divided into two different types, “chronical” and “gradual”, relating chronic defaults to those caused by external circumstances and gradual failures to internal causes.

These mixed findings suggest that relevant questions about external and internal causes of business failure remain unanswered. Combined with the fact that “limited attention has been paid to the interactive effects of the internal and external factors” (Amankwah-Amoah, 2016, p. 3394), this lack of explanation has inspired this study to examine the influences of both external and internal causes when explaining business failure.

As mentioned before, it is suggested that auditors must disclose the risks regarding a firm's viability and any other uncertainties discovered in the firms' financial statements when issuing a qualified opinion. Thus, all types of causes of business failure should be mentioned in the report, regardless of whether they are related to external factors, such as regulatory effects, environmental economic events or viability plans approved by firms' creditors, or internal circumstances, such as, for example, the valuation and impairment of the firms' properties, the payments of the firms' debts, or the existence of recurring losses from prior periods in the company. Thus, the audit report should mention in its content the likelihood of business failure and the causes of this situation.

Following the core studies that defended the theory of the combined use of exogenous and endogenous causes for an accurate explanation of business failure (Amankwah-Amoah, 2016; Carter & Van Auken, 2006), we propose that a connection of both causes mentioned by auditors in the reports might contribute to explain business failure more than the consideration of external or internal factors in isolation would. Thus, we suggest the following hypothesis.

Hypothesis 2. Disclosures in the audit report about both external and internal factors are significant in explaining the causes of business failure.

We expect that both internal and external causes of business failure should be included in the audit report, contributing to explaining failure from the auditor's point of view. Regarding the current trend of research into the relationship of failure with external or internal causes, the originality of our paper is the association between the field of business failure and the auditing profession.

3. Methods

3.1. Data and sample

Our sample consists of all failed Spanish firms in the Bureau Van

Dijk database (hereafter BVD)⁴ as of the end of January 2015, totalling 1821 firms. We consider a company to be failed if it has filed for insolvency legal proceedings, as in the prior literature (Lizarraga-Dallo, 1998; Piñero-Sánchez et al., 2013; Zorn et al., 2017). We adopt this legal, objective and narrow definition because the Spanish bankruptcy process consists of single court proceedings that start when a company faces financial distress and therefore cannot pay its debts. Thus, for a firm to be considered failed in our sample, its insolvency legal proceedings must be ongoing as of the end of January 2015, regardless of the date on which the process began. Further, for every failed firm, we extract its financial and audit data from the BVD database for the fiscal year prior to the filing event. Because this date is not available in this source, we had to collect the information manually from a different one, the “Registro Público Concursal” (hereafter RPC),⁵ creating an ad-hoc dataset. After removing firms not registered in the RPC and observations with missing financial and audit data, we had a final sample of 404 failed firms. In the sample, all the filings occurred in 2004–2014, although > 99% of the firms filed after 2008, that is, after the global financial crisis (see Section 4.1 for details). The period covered is appropriate for this study because the Spanish Bankruptcy Act 22/2003 of July 9 came into effect in 2004 and the new audit reporting regulatory changes started in 2015.

Subsequently, following the prior research on business failure, we match each failed firm with a non-failed one (Blay et al., 2011; Carcello & Neal, 2003; McGurr & DeVaney, 1998). The matching procedure is performed by year, firm size—using the value of total assets—and industry, as in the previous literature (Knechel & Vanstraelen, 2007; Schwartz & Menon, 1985). We extract the financial and audit data of the non-failed group from the BVD database for the corresponding year, that is, the year that is identified for the failed firm in each pair. This process results in a total sample of 808 Spanish firms: 404 failed and 404 non-failed companies, all of which are non-financial and audited firms.

The decision to select a Spanish sample is due to the following reasons. First, according to La Porta, López-de-Silanes, Shleifer, and Vishny (1998), Spain is considered a “French-civil-law” or “common-law” country in which law enforcement is low compared to law enforcement in “code-law” countries, such as those in North America, in which most of the business failure research has been carried out (Piñero-Sánchez et al., 2013). Second, the litigation risk for Spanish audit firms is also low, and audit regulation tends to be flexible (Arnedo-Ajona, Lizarraga-Dallo, & Sánchez-Alegría, 2008; Ruiz-Barbadillo, Gómez-Aguilar, de Fuentes-Barberá, & García-Benau, 2004). Therefore, it seems reasonable to believe that when a cause of business failure is mentioned in the audit report under a non-litigious and flexibly regulated environment, it must represent a strong and relevant issue affecting the firm. Finally, the audit report is a well-defined and standardised document; thus, the evidence could be most likely generalised to other regimes.

3.2. Dependent variable

Our dependent variable is a dummy variable that indicates whether business failure occurs (*FAILED*). As failure is proxied by the declaration of legal proceedings, this variable takes the value of 1 when legal proceedings start and 0 otherwise.

⁴ The Bureau Van Dijk database in Spain is called SABI, or the “Sistema de Análisis de Balances Ibéricos” database. More information is available at <https://sabi.bvdinfo.com>.

⁵ As the “Registro Público Concursal” is the official Spanish source of bankruptcy data, all companies under insolvency legal proceedings must be registered here.

Table 2

Classification and description of independent variables (audit report disclosures that explain causes of business failure).

1	<i>ASSETS</i>	Categorical variable with a value of 1 if the audit report includes 1 disclosure regarding assets, a value of 2, 3, 4 or 5 if those are the number of assets' disclosures, and 0 if no comment appears. Assets' disclosures include comments related to non-current assets (tangibles and intangibles, long-term financial investments, and deferred tax assets) and current assets (inventories, short-term financial investments and cash).
2	<i>LIABIL_CONTING</i>	Categorical variable with a value of 1 if the audit report includes 1 disclosure related to long-term and short-term debts or contingent liabilities, 2 if it contains two disclosures, and 0 if there are no disclosures regarding liabilities or contingencies.
3	<i>RESULT_PERIOD</i>	Dummy variable with a value of 1 if the audit report includes any commentary related to the components of the results of the period (revenues and expenses) and 0 otherwise.
4	<i>ACCUM_LOSSES</i>	Dummy variable with a value of 1 if the audit report informs about the firms' accumulated losses or negative results from previous years and 0 otherwise.
5	<i>INFO_OMISSION</i>	Dummy variable with a value of 1 if the audit report contains any commentary about information not provided to verify all accounts in the financial statements and 0 otherwise.
6	<i>NEGAT_WC</i>	Dummy variable with a value of 1 if the audit report contains any commentary about the firm's negative working capital and 0 otherwise.
7	<i>SUBSEQ_EVENTS</i>	Dummy variable with a value of 1 if the audit report contains any commentary about the firm's subsequent events and 0 otherwise.
8	<i>REGUL_ENVIRON</i>	Categorical variable with a value of 1 if the audit report includes one comment related to regulatory or external economic environmental factors that affect the firm, 2 if it contains two disclosures regarding these matters, and 0 if there are no disclosures regarding regulation or the market.
9	<i>MGMT_PLAN</i>	Dummy variable with a value of 1 if the audit report includes any commentary related to a management or viability plan being implemented by the firm and 0 otherwise.
10	<i>GC</i>	Dummy variable with a value of 1 if the audit report includes a going concern qualification, for example, a comment related to uncertainties about the firm's viability, and 0 otherwise.
11	<i>INSOLV_PROCEED</i>	Dummy variable with a value of 1 if the audit report informs about the firm's filing for insolvency legal proceedings and 0 otherwise.

This table summarizes the eleven independent variables of the study (second column) and their definition (third column). These variables represent causes of business failure in the current work, which have been identified by auditors and then disclosed by them in their audit reports. These variables are as follows: *ASSETS* (assets), *LIABIL_CONTING* (liabilities and contingencies), *RESULT_PERIOD* (result of the period), *ACCUM_LOSSES* (accumulated losses), *INFO_OMISSION* (information omission), *NEGAT_WC* (negative working capital), *SUBSEQ_EVENTS* (subsequent events), *REGUL_ENVIRON* (regulation and environment), *MGMT_PLAN* (management plan), *GC* (going concern) and *INSOLV_PROCEED* (insolvency proceedings). Clarification for some of the causes follows: *RESULT_PERIOD* is a variable used to cover circumstances, such as low valuation or incorrect accrual of expenses, and high valuation or revenues booked in advance. Additionally, this item covers doubtful revenues and expenses with related parties. *NEGAT_WC* is the variable representing the situation in which the auditor deliberately indicates that the firm has a negative working capital; therefore, its current assets are lower than its current liabilities, manifesting a clear evidence of liquidity issues and financial difficulties. *SUBSEQ_EVENTS* is the variable representing causes of business failure explained by subsequent events, which are significant occurrences that happen in the firm after the closing of the year and occasionally emphasised by the auditor in the report.

3.3. Independent variables

We test [Hypothesis 1](#), using 11 independent variables (see [Table 2](#) for a summarized explanation of each variable). These variables represent the causes of business failure explained in the audit report disclosures. We identify these causes by manually reading and labelling all the reports in the sample,⁶ based on an aggregated version of an existing codification of audit reports in the literature ([Muñoz-Izquierdo, Camacho-Miñano, & Pascual-Ezama, 2017](#)). We use the audit report from the year prior to the insolvency filing for the failed firm and the audit report from the same year for the paired non-failed firms. This process is performed by both authors and an external accounting and auditing expert, and the results are compared to avoid any errors. For every audit report, one author codifies it, and another tests it in a double check. Some disclosures might give rise to ambivalence when coding. We segregate all audit report disclosures into internal and external causes of business failure. The final classification is agreed upon. We assume that internal causes are contained in the disclosures related to specific accounting elements, and external causes are shown in the environmental comments disclosed by the auditor in the report.

There are specific accounting elements mentioned by the auditor: issues related to assets, liabilities, the result of the period, accumulated losses, information omitted, negative working capital, and subsequent events after the closing of the fiscal year. Comments associated with accounting elements could be included either in the emphasis or the qualification paragraphs. Frequently, most of the comments affect more than one accounting element. In these cases, to avoid duplicates and to

simplify the codification, we choose to consider the element explicitly mentioned by the auditor.

The seven variables created to explain the internal causes of business failure related to accounting elements are specified as follows.

- *ASSETS*. This category includes non-current and current assets. Non-current assets consist of comments regarding tangibles and intangibles, long-term financial investments, and deferred tax assets. Facts related to tangible and intangible assets are valuation, such as reasonableness, or issues with impairments, depreciation and amortization. Recurring tangible assets are land, buildings and investment properties. Intangible assets highlighted are research and development, administrative concessions and goodwill. Comments about long-term financial investments are the ones associated with discrepancies in the valuation or impairment of investments in related parties, such as group companies or associates. Deferred tax assets' comments appear when the company will not be profitable in the foreseeable future. Regarding current assets, comments about inventories, short-term financial investments and cash are explicitly disclosed. Discrepancies in the inventories' valuation, impairment or scope limitations are frequently mentioned, as well as disagreements with the valuation of liquid investments or inadequate recognition of impairment, and any other issues that affect liquidity.
- *LIABIL_CONTING*. All comments on liabilities and contingencies are summarized under this category. Loan restructurings, difficulties in paying back the principal of the debt, negotiation with financial creditors or the impossibility of verifying the accounting balances of financial liabilities are common examples of the types of comments in the audit report associated with debts. Contingent liabilities' disclosures show all situations in which the auditors mention potential obligations not recognized by the firm yet.
- *RESULT_PERIOD*. Specific comments associated with the components of the results of the period (expenses and revenues) are included under this variable. For expenses, we gather circumstances of low valuation, incorrect accrual, or doubtful expenses related to group companies. For revenues, we consider high valuation, revenues booked in advance or doubtful revenues with related parties.

⁶ The complete audit report is not available in the Bureau Van Dijk's database. The available field, called "Auditor's opinion", contains a literal replication of a maximum of 991 characters of the report. Generally, this section contains emphasis paragraphs, qualification paragraphs, or both. Thus, we might consider this fact to be a limitation of our dataset because there might be some incomplete or missing paragraphs due to the database configuration.

⁷ In [Muñoz-Izquierdo et al. \(2017\)](#), the content of audit reports is classified into 20 variables. For the aims of this study, we have aggregated all the audit report disclosures into an 11-item codification.

- *ACCUM_LOSSES*. Under this variable, we assemble any warnings about significant losses during the last year, as well as the accumulated negative results from previous years.
- *INFO_OMISSION*. We bring out this variable when enough information is not provided to the auditor to verify all accounts in the financial statements. For instance, any commentary about information omitted in the notes to the financial statements is included here.
- *NEGAT_WC*. This variable shows any situations in which the auditor deliberately indicates that the firm has negative working capital, indicating that the current assets of the company are lower than their current liabilities. Consequently, the auditor justifies a clear evidence of financial difficulties and liquidity issues.
- *SUBSEQ_EVENTS*. Occasionally, the auditor emphasises significant events after the closing of the fiscal year, although these do not affect the current financial statements.

Additionally, the auditor frequently highlights issues that affect the firm's industry-specific and environmental factors. These are also considered in the selection of variables. The four independent or explanatory variables remaining, which are specified below, allude to external causes of business failure.

- *REGUL_ENVIRON*. We refer to legal circumstances that are external to the company but may affect the business significantly, such as legal reforms in the industry, issues related to taxes, customs duty, any type of inspections and any changes in the accounting regulations. We also include any negative messages sent by the auditor in the report—generally as emphasis paragraphs—regarding macroeconomic-level information that may impact the company's business, such as the global financial crisis, a negative evolution of the budget, an excessive supply in the company's industry, or a low demand for the firm's products.
- *MGMT_PLAN*. In emphasis paragraphs, some auditors mention positive messages about the attempts of failed firms to reorganize the business during legal court proceedings. Thus, any mitigating factors to avoid an insolvency situation, the approval of a management plan, or new agreements with creditors are summarized under this variable.
- *GC*. According to the going concern assumption, assets and liabilities are recorded on the basis that the entity will be able to sell its assets and discharge its liabilities in the normal course of the business. The auditor mentions if this assumption is not appropriate, which shows a clear sign of viability risks.
- *INSOLV_PROCEED*. Most of these comments appear in emphasis paragraphs, in which auditors try to draw attention to companies filing for bankruptcy voluntarily or to firms already dealing with trustees in the later phases of the legal court proceedings.

3.4. Analysis

Our model is estimated using logistic regression, which is the most common method applied in the prior literature on business failure (Altman & Sabato, 2007; Balcaen & Ooghe, 2006; Cultrera & Brédart, 2016; Ohlson, 1980; Zorn et al., 2017). To classify the sample between failed and non-failed firms, this model identifies the causes of business failure mentioned by auditors. We capture industries using the 4-digit NACE⁸ codes. To determine whether multicollinearity issues are present, we run the multicollinearity test of variance inflation factors (VIFs). Our untabulated results show that there is no multicollinearity in our model because all the VIFs were less than the generally accepted cutoff of 10 (Hernández-Tinoco & Wilson, 2013; Neter, Wasserman, &

Kutner, 1989).

4. Results and discussion

4.1. Descriptive analysis

In Table 3, we provide the filing dates by year of the 404 firms in the failed sample. As seen, most of the failed firms filed for bankruptcy between 2008 and 2014; in other words, most of the filings occurred after the global financial crisis.

Additionally, other summary statistics for the failed and non-failed sub-samples are also provided in Table 3. Due to our matching procedure, both groups have the same frequency per industry. Our sample firms span 5 industries: construction and real-estate firms (35%), the largest group mainly due to the impact of the housing bubble in Spain (Conefrey & Gerald, 2010); manufacturing (27%); commercial (20%); services firms (17%); and a small group of companies that belong to the primary sector (1%). The average age of the sample is 22 years old for failed firms and 23 years old for non-failed firms, and due to the matching procedure, an additional control for firm size, which is measured by total assets, is included in our analyses.

Regarding the firms' financial condition, compared to non-failed companies, failed companies show lower liquidity, as measured by the working capital to total assets ratio (WCTA), less profitability, as measured by the return on assets ratio (EBITTA), and higher leverage, using the book value of equity to total liabilities (BVETL). These ratios have been frequently used in business failure studies (Bellovary, Giacomino, & Akers, 2007; Tascón-Fernández & Castaño-Gutiérrez, 2012), and our univariate results are consistent with the prior literature, indicating that firms filing for insolvency protection are generally more illiquid, less profitable, and more leveraged than non-failed firms (Altman et al., 2017).

4.2. Logistic regression analysis

We present the results of the logit model in Table 4.

In the model summary tests, the Nagelkerke R square is 54%, demonstrating sufficient strength of association. However, the interpretation of this measure (as well as the Cox and Snell R square) in logit models should be used only for comparison purposes because it does not have the same meaning as it has for ordinary least squares regressions (Hernández-Tinoco & Wilson, 2013). A good measure to verify that the model fits with the data is the Hosmer and Lemeshow test statistic. The test is not significant, which can be interpreted as indicating that the logit model fits very well with the data.

The discriminating power of the model is calculated for the estimation sample and the test sample. The estimation sample represents 75% of the dataset used to run the regression. For these firms, the classification accuracy is 81.4%. However, it is more reasonable to use the classification accuracy of the test sample, which is the 25% of the data not used in the regression. Using the test sample, the accuracy slightly decreases to 79.6%, in agreement with the results of other studies (Altman et al., 2017; Du Jardin, 2017). We consider this percentage to be very high—because we are explaining the causes of business failure only with the disclosures of the audit report—compared to the accuracy of other studies that obtain similar results by using accounting ratios or even by using a combination of ratios and non-financial data (Altman et al., 2017).

Thus, in line with the prior literature, audit reports include additional information beyond accounting ratios for explaining business failure (Hopwood et al., 1989). Moreover, we find novel results regarding the causes of failure mentioned in the reports. Considering the variables of the model displayed in Table 4, the results indicate a significant (p -value < 0.05) and positive relationship between the probability of failure and the valuation of the firm's assets (*ASSETS*). Although in the form of commentary in the audit report, this is consistent

⁸ The NACE codification is the statistical classification of economic activities in the European Community, abbreviated as NACE.

Table 3
Descriptive summary.

Frequency of years in the sample				
Years	Number of failed firms (%)			
2004	1 (0%)			
2005	1 (0%)			
2006	1 (0%)			
2007	1 (0%)			
2008	23 (6%)			
2009	24 (6%)			
2010	21 (5%)			
2011	29 (8%)			
2012	65 (16%)			
2013	146 (36%)			
2014	92 (23%)			
Total	404 (100%)			

Frequency of industries classified by failure				
	Failed firms	Non-failed firms	Total	Total (%)
Construction and real-estate	141	141	282	35%
Manufacturing	110	110	220	27%
Commercial	79	79	158	20%
Services	70	70	140	17%
Primary	4	4	8	1%
Total	404	404	808	100%

Means and standard deviations by failure				
	Failed firms		Non-failed firms	
	Mean	S.D.	Mean	S.D.
Age (years)	22	13	23	14
Size (total assets)	84,352	276,969	84,431	293,514
WCTA	-0.090	0.401	0.239	0.307
EBITTA	-0.169	0.329	0.026	0.104
BVETL	0.278	1.098	1.728	3.015
Number of observations	404		404	

This table reports the summary statistics of the sample, divided into failed and non-failed firms. The total sample comprises 808 corporations, of which 404 have filed for insolvency legal proceedings (failed firms) and are manually matched by year, size (total assets) and industry, with 404 non-failed companies. First, industries of the sample are shown (frequency by groups and percentage in total). The 5-category industry classification is created based on NACE codes. Second, the means and standard deviations are presented for failed and non-failed groups for the following variables: age (expressed in years), size (total assets in thousands of euros), WCTA (Working capital by total assets), EBITTA (Earnings before interest and taxes by total assets) and BVETL (Book value of equity by total liabilities). The data used to calculate the financial ratios is winsorized at the 1% and 99%.

with prior research that affirms that asset ratios help to determine business failure (Lukason & Hoffman, 2014; Premachandra, Bhabra, & Sueyoshi, 2009). Issues regarding liabilities and contingencies (*LIA-BIL_CONTING*) also indicate clear explanation for the causes of business failure. This finding goes in line with previous studies that suggest that increases in debts cause a gradual worsening of the firm's financial condition (Laitinen, 2005; Ooghe & de Prijcker, 2008). In addition, the positive and significant (p -value < 0.05) coefficients in concerns about recognition of revenues and expenses that comprise the result of the fiscal year (*RESULT_PERIOD*) and the existence of accumulated losses (*ACCUM_LOSSES*) in the firm are explicit determinants of failure. These results agree with prior findings that stated that failures are associated with insufficiency in the amount of equity (Laitinen & Laitinen, 2009).

To control for audit quality and auditor independence, the proxy of the issuance of a going concern opinion has been used, as in the previous literature (DeFond, Raghunandan, & Subramanyam, 2002; DeFond & Zhang, 2014). The coefficient on this going concern variable (*GC*) is positive and statistically significant (p -value = 0.000), indicating that when auditors issue a going concern qualification, this represents a prominent determinant of business failure. This result is similar to the evidence obtained by Altman et al. (2010), who suggested that severe and going concern qualifications are adequate indicators

that the long-term viability of the firm is in some doubt. Additionally, there is a significant and positive relationship between business failure and the insolvency proceedings' indicator (*INSOLV_PROCEED*). Thus, we provide evidence that auditors often include in the report, prior to filing, a critical comment explaining to investors that the firm is already initiating this legal process. As previously analysed in a similar Spanish context by Camacho-Miñano, Segovia-Vargas, and Pascual-Ezama (2015), most firms entering court proceedings end up being liquidated, so that an apparent determinant of failure is embedded in that audit report disclosure.

All these previous results are consistent with our *Hypothesis 1* because evidence shows that disclosures are significant for explaining the causes of business failure and achieve this goal with an accuracy of approximately 80%, which represents a high ability according to prior literature (Altman et al., 2017).

Moving to our *Hypothesis 2*, to test whether firms fail due to internal or external causes, that is, management actions or industry-specific and environmental factors, respectively, we take a more in-depth look at the disclosures to determine whether comments that significantly increase the classification accuracy of the model are related to internal or external reasons. We find that the statistically significant variables of the model (p -value < 0.05) are disclosures in the audit

Table 4
Results of the logistic regression analysis.

Dependent variable: <i>FAILED</i>						
Parameters of the model						
Variables	Coeff.	Std. dev.	Wald statistic	Degrees of freedom	p-Value	Exp (B)
<i>ASSETS</i>	1.847	0.201	84.650	1	0.000	6.339
<i>LIABIL_CONTING</i>	0.813	0.330	6.053	1	0.014	2.255
<i>RESULT_PERIOD</i>	1.588	0.467	11.578	1	0.001	4.896
<i>ACCUM_LOSSES</i>	1.062	0.528	4.040	1	0.044	2.892
<i>INFO_OMISSION</i>	−0.404	0.466	0.752	1	0.386	0.667
<i>NEGAT_WC</i>	−0.284	0.623	0.208	1	0.648	0.753
<i>SUBSEQ_EVENTS</i>	2.011	1.158	3.013	1	0.083	7.471
<i>REGUL_ENVIRON</i>	0.242	0.409	0.352	1	0.553	1.274
<i>MGMT_PLAN</i>	−0.637	0.716	0.790	1	0.374	0.529
<i>GC</i>	2.548	0.530	23.156	1	0.000	12.783
<i>INSOLV_PROCEED</i>	1.662	0.840	3.917	1	0.048	5.272
<i>Constant</i>	−1.602	0.156	104.958	1	0.000	0.202

Model summary tests						
− 2 log-likelihood		527.742		Hosmer & Lemeshow test:		
Cox & Snell R-square		0.403		Chi-square		p-Value
Nagelkerke R-square		0.538		5.832		0.442

Classification accuracy of the model						
Observed:	Estimation data:			Test data:		
	Predicted:			Predicted:		
	Failed	Non-failed	Correct, %	Failed	Non-failed	Correct, %
Failed	237	58	80.3%	86	23	78.9%
Non-failed	55	257	82.4%	18	74	80.4%
			81.4%			79.6%

This table presents the logit model results that explain the causes of business failure. In the first section of the table, the parameters of the model (disclosures in the audit report that represent the causes of failure) are displayed. This section shows, in order, coefficients, standard errors, Wald test, degrees of freedom, *p*-values and B-exponential. The second section contains the measures of the model: − 2 log-likelihood, Cox and Snell R-square, Nagelkerke R-square, and Hosmer and Lemeshow goodness-of-fit test. Finally, the third part includes the classification between failed and non-failed firms depending on the causes of failure identified (or not) in the audit reports. The classification accuracy is calculated with the sample used to run the regression (the estimation sample, which represents 75% of the total sample) and the test sample (25% remaining) to validate the results. The absolute numbers for failed and non-failed firms are the observed values, and the correct predicted values are displayed in the percentage for failed and non-failed samples, as well as for the overall dataset.

report related to both internal and external causes of failure. Lukason (2016) reached the same conclusion using a different source of information: the assessment according to their bankruptcy regulations of Estonian trustees in court judgements.

More specifically, the internal causes that best explain business failure are issues regarding valuation, depreciation and impairment of assets (*ASSETS*), cancellation of liabilities, a need to record contingencies for potential debts (*LIABIL_CONTING*), problems with the generation of revenues or the accrual of expenses (*RESULT_PERIOD*), and the existence of accumulated losses from prior periods (*ACCUM_LOSSES*). Regarding external causes, the most accurate determinants of the existence of business failure are going concern uncertainties (*GC*), which are material concerns about the company's ability to continue its activity in the foreseeable future, and the moment at which the auditor already mentions the beginning of legal proceedings (*INSOLV_PROCEED*).

This evidence verifies Hypothesis 2 because, as predicted, these variables' coefficients have positive and significant signs, suggesting that when these disclosures appear in the report, the model increases its power. Therefore, these comments represent useful information to anticipate the antecedents of business failure. This is consistent with the body of literature that suggests that an integration of both firm-level factors and exogenous circumstances offers a more powerful explanation of the causes of organizational failure than internal or external

factors do in isolation (Carter & Van Auken, 2006; Mellahi & Wilkinson, 2004). This finding is probably due to the complexity of current markets and regulatory contexts, in which a broader picture offered by the deterministic and voluntaristic perspectives of organizational failure taken together helps to clarify the various facets of business failure (Amankwah-Amoah, 2016).

4.3. Robustness

To ensure the viability of our results, we performed several robustness checks using different methodologies. Because a very traditional parametric technique has been used (logit), we test whether the results remain constant, using two sophisticated methods of artificial intelligence, namely, the rough set method and the C4.5 algorithm. We choose artificial intelligence because there are calls in the literature to apply these methodologies for use in auditing and accounting topics (Amani & Fadlalla, 2017) and they do not require the data to satisfy any concrete statistical assumptions (Calderon & Cheh, 2002).

The rough set is a mathematical method that identifies dependencies among attributes and searches for association rules with them to solve a classification problem. In line with Amani and Fadlalla (2017), this decision rule model fits very well with the explanation of business failure. In our study, the attributes are represented by the independent variables (causes of business failure illustrated in disclosures

Table 5
Results of decision rules from rough set model.

Dependent variable: <i>FAILED</i>				
Rule	Classification	No. of cases	Correctly classified	Rule explanation
1	Non-failed	359	299	$SUBSEQ_EVENTS = 0 \ \& \ INSOLV_PROCEED = 0 \ \& \ NEGAT_WC = 0 \ \& \ ACCUM_LOSSES = 0 \ \& \ RESULT_PERIOD = 0 \ \& \ LIABIL_CONTING = 0 \ \& \ ASSETS = 0 \ \& \ REGUL_ENVIRON = 0.$
2	Failed	119	77	$SUBSEQ_EVENTS = 0 \ \& \ INSOLV_PROCEED = 0 \ \& \ NEGAT_WC = 0 \ \& \ ACCUM_LOSSES = 0 \ \& \ RESULT_PERIOD = 0 \ \& \ LIABIL_CONTING = 0 \ \& \ ASSETS = 1 \ \& \ REGUL_ENVIRON = 0.$
3	Failed	77	77	$INSOLV_PROCEED = 1 \ \& \ LIABIL_CONTIN = 0.$
4	Failed	32	26	$INSOLV_PROCEED = 0 \ \& \ ACCUM_LOSSES = 0 \ \& \ RESULT_PERIOD = 0 \ \& \ LIABIL_CONTING = 0 \ \& \ ASSETS = 2 \ \& \ REGUL_ENVIRON = 0.$
5	Failed	8	8	$LIABIL_CONTIN = 2.$
6	Failed	8	8	$REGUL_ENVIRON = 2.$
7	Failed	4	4	$ASSETS = 3.$

This table shows the rules generated by the rough set analysis to explain causes of business failure with our matched sample of 808 companies (404 failed and 404 non-failed). The dependent variable, *FAILED*, takes the value of 1 when the firm is under insolvency legal proceedings (failed) and 0 otherwise (non-failed). The independent variables (causes of business failure) are the audit report disclosures codified: *ASSETS* (assets), *LIABIL_CONTING* (liabilities and contingencies), *RESULT_PERIOD* (result of the period), *ACCUM_LOSSES* (accumulated losses), *INFO_OMISSION* (information omission), *NEGAT_WC* (negative working capital), *SUBSEQ_EVENTS* (subsequent events), *REGUL_ENVIRON* (regulation and environment), *MGMT_PLAN* (management plan), *GC* (going concern) and *INSOLV_PROCEED* (insolvency proceedings). See Table 2 for a detailed description of the independent variables. The rough set analysis generates 7 rules, presented in the table (first column). Rule 1 explains non-failed firms (*FAILED* = 0), as this rule identifies no causes of business failure. The remaining rules (2 to 7) classify the group of failed firms (*FAILED* = 1), distinguishing the different causes of failure. The number of cases, the cases correctly classified and the explanatory or independent variables for each rule are disclosed in the third, fourth and fifth column of the table, respectively.

in the audit report), and the problem relates to classifying failed and non-failed firms. With this methodology, we obtain seven rules: one that explains non-failed firms, as this rule identifies no causes of business failure, and six that classify failed firms by distinguishing the different causes of failure, as shown in Table 5.

The rule that classifies non-failed firms is strong because it is verified in almost 300 of 359 cases. It indicates that in these audit reports, there is an absence of causes of business failure mentioned (all independent variables in the rule take the value of 0). For the classification of failed firms, an issue regarding the assets' valuation, as well as other matters in the firm's real and potential debts (liabilities and contingencies), represents a key that might indicate a high probability of business failure. External circumstances, such as regulatory changes or market reactions that affect the industry in which the company operates and initial phases of court proceedings, are clear determinants of business failure. In the rough set, the classification accuracy equals 80.0%, indicating that in 80 of 100 cases, this methodology accurately distinguishes between failed and non-failed companies. This percentage is almost the same as that obtained by logit, so this evidence suggests that our results are robust using the rough set.

Second, we apply the C4.5 algorithm as an additional robustness test. The C4.5 algorithm is a widely used decision tree developed by Quinlan (1993). Unlike the regression, in which we can only identify the causes that explain business failure, a decision tree contributes more to the interpretation of our results because it shows failure processes, that is, the ways or "paths" that cause failure (Díaz-Martínez, Sanchís-Arellano, & Segovia-Vargas, 2009). After the decision tree is "pruned" (all branches of specific cases are eliminated because they do not assist in explaining results that can be generalised), the C4.5 obtains a simple, accurate and robust tree that shows (in the form of "branches" or rules) the most common causes of business failures in the sample.

Our untabulated findings reveal that using the C4.5 algorithm, the classification accuracy is maintained (79.8%), indicating that the causes mentioned in disclosures in the audit report continue signalling useful incremental information about business failure. Moreover, the interpretation of the likelihood of business failure is not only explained by the external reasons mentioned, as population ecology theory defends (Hannan & Freeman, 1977), but also by the internal circumstances that assist in explaining business failure (Nutt, 2002). The complexity of business models today could be a reason for finding that the best explanatory power is found with a combination of both causes.

5. Conclusion

The aim of this paper is to analyse the explanatory power of disclosures in the audit report when identifying causes of business failure. We proxy failure by the beginning of insolvency court proceedings. Then, the audit report of the year prior to failure is examined, codified and used to identify the causes of failure to distinguish between failed and non-failed firms. We use an ad-hoc matched sample of 404 failed and 404 non-failed Spanish audited firms, and we apply different parametric (logit) and non-parametric (artificial intelligence) methodologies to build several estimation models. Our results are consistent among the different methods applied and suggest that the causes of business failure mentioned by auditors as comments in the audit report have approximately 80% accuracy when explaining the event of failure. Additionally, our evidence indicates that disclosures that mention causes related to a combination of both internal and external factors of this event contribute to explain business failure. This evidence agrees with proponents of integrating exogenous and endogenous factors to offer a more complete explanation of the causes of business failure (Amankwah-Amoah, 2016).

5.1. Implications for researchers

Some implications can be drawn from these results for researchers. First, this paper contributes to calls from the literature for a more integrated discussion of the causes of business failure across social science disciplines (Lukason, 2016; Trahms et al., 2013), namely, the discussion of the causes of business failures linked with the discipline of auditing.

Second, our evidence indicates that business failure can not only be explained by using financial information, which is the most commonly source of data applied (Altman et al., 2017; Balcaen & Ooghe, 2006; Bellovary et al., 2007), but also by focusing on the disclosures extracted from the audit report. Traditionally, following this idea, research has combined accounting data with other sources of information. Our results contribute to this line of research because we obtain valuable explanatory power when explaining the firms' insolvency situations, avoiding the use of accounting information and relying on audit information only, which is an innovative contribution.

Third, on the one hand, we find evidence that firms for which the auditor issues a clean report (with no disclosures) seem to be non-failed businesses. On the other hand, for non-failed firms, in the report,

auditors detect and disclose some circumstances, which are related to both external and internal causes of plausible failure. Our study extends prior work on the combination of external and internal factors when explaining failure by ascertaining whether and which types of causes specifically help in anticipating financial distress. While internal factors related to the firms' assets valuation represent factors that explain failure more accurately, these remarks, together with external factors, such as the auditor's going concern uncertainty or the initial steps of the company's voluntary insolvency proceedings, notably assist in identifying a business that is about to fail.

The implications of these results are very important because we identify that the audit report is a valuable tool not only for explaining the causes of failure but also for anticipating how to avoid the companies' extinctions. In this sense, the role of auditors is crucial at this point. In fact, our results suggest that auditors are essential for detecting issues with the businesses' survival. In particular, if the remarks mentioned above (about going concern uncertainties, assets, subsequent events and legal court proceedings) are found in an audit report, the auditor is notably assisting in identifying a business that is about to fail.

5.2. Implications for practice

Our study has several important implications for managers and regulators examining the audit report. First, our findings indicate that the audit report could be a “first glance” warning of business failure. Because this document is standardised and available to users, it represents a quick and easy way for managers to anticipate early signals of business failure to avoid the consequences of bankruptcy. Disclosures in the audit report, such as comments about going concern uncertainties, should be considered key information that identifies causes or antecedents of the event of failure.

Finally, our evidence might represent a timely and important contribution for regulators and the auditing profession due to the current international auditing environment, in which regulatory changes focusing on the audit report are occurring worldwide with the main purpose of emphasizing the confidence, transparency and information value of the audit report. For instance, in March 2016, Dan Montgomery (Chair of the Auditor Reporting Implementation Working Group and former Deputy Chair of the IAASB) suggested that the current changes are the greatest in the audit report in > 50 years. The changes are resulting in a “new and improved audit report that provides more transparency about important aspects of the audit, and better describes what an audit is and what the auditor does” (IAASB, 2016). According to these regulatory changes, upcoming audit reports will identify even more causes of business failure than the ones analysed in this work.

5.3. Limitations and future research

This study is not free of limitations. In the paper, we have already highlighted the audit report data limitation due to the database configuration. Moreover, we have also mentioned the specific codification process of audit report disclosures in this study. Although two professionals classified the sample separately, the procedure was manual and might be considered subjective. In a future line of research, new automatic techniques for qualitative data should be used to analyse the audit reports of companies having financial difficulties. Additionally, this study could be expanded to other regulatory contexts to compare the ability to identify causes of business failure reflected in Spanish audit reports with that of other audit reports.

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