ARE YOU A ZOMBIE FIRM? SHOW ME YOUR AUDIT REPORT!

Manuel Jiménez Mazarío

Junior auditor. PhD student. Department of Accounting and Finance. Complutense University of Madrid, Faculty of Business Administration and Economics, Somosaguas Campus, 28223, Pozuelo de Alarcón, Madrid, Spain.

Nora Muñoz Izquierdo

Assistant professor. Department of Accounting, CUNEF (Colegio Universitario de Estudios Financieros), Leonardo Prieto Castro, 2, Ciudad Universitaria, 28040, Madrid, Spain.

María del Mar Camacho Miñano

Associate professor. Department of Accounting and Finance. Complutense University of Madrid, Faculty of Business Administration and Economics, Somosaguas Campus, 28223, Pozuelo de Alarcón, Madrid, Spain.

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Abstract

Zombie companies are highly indebted, have low efficiency and low profitability. They capture public financial resources that should be distributed to more efficient companies and they are difficult to identify. Therefore, zombie firms represent a severe problem to the financial markets. In this paper, we empirically analyze the informativeness of extended audit reports in identifying zombie firms and, more specifically, the usefulness of Key Audit Matter paragraphs (KAMs) on this purpose. To our knowledge, our study is the first to predict potential zombie companies using the content of extended audit reports. From a sample of 228 Spanish firms in 2017, we extract the KAMs disclosed in their extended audit reports. Using logistic regression analysis, our results suggest that KAMs accurately anticipate when a firm can be considered zombie, specially KAMs related to going concern uncertainties in which auditors warn investors about the viability of the company in the foreseeable future, without qualifying the audit opinion. This evidence extends prior research on the ability of going concern qualifications in predicting financial distress.

1. INTRODUCTION

This paper investigates whether the content of the expanded audit report known as Key Audit Matters (KAMs) contributes to identifying zombie companies. The answer to this question contributes to previous literature because it is the first to distinguish these companies using audit data and, specifically, KAMs.[1] KAMs represent a matter assessed by the auditor as a significant area of risk of material misstatement for the client firm, a demand for more informative audit reports and in particular for auditors to provide more relevant information on companies' risks to users of financial information (Abad et al., 2017). For example, areas of significant audit risk or matters where management and directors were required to make essential judgements or estimates in preparing and fair presentation of the financial statements. The International Auditing and Assurance Standards Board (IAASB) approved a new international standard that incorporates significant changes to the information contained in audit reports (IFAC, 2013) as KAMs are.

The fundamentals of this research lie in three fundamental reasons: (1) The complexity when defining what a zombie company is, (2) the scarcity of studies at the microeconomic level that analyzes this type of companies, and (3) the usefulness of the audit report in the identification of companies with financial difficulties.

In previous research on zombie companies, there is a wide variety of definitions. Some authors consider zombies those companies that are highly inefficient, excessively indebted and with very low or even negative productivity (Caballero et al., 2008). Other authors define them as those unable to generate sufficient resources, even to cover the financial expenses of their debts (Parte & Camacho-Miñano, 2020). They also sought to identify using non-financial data (Hoshi, 2006), for example, based on their geographical location, industry, size, or age of the company. Therefore, there is no accepted and widespread definition of the concept of zombie enterprise, and the same goes for empirical research at the micro level of these companies.

The reason why the interest of this research's topic arises is that zombie companies can seriously compromise a country's economy and limit its growth (Caballero et al., 2008). They are considered a threat that can reduce competitiveness and value creation capacity in a territory (Ahearne & Shinada, 2005). Despite the threat, they pose to the economy and existing studies in this field at the macroeconomic level (Banerjee & Hofmann, 2018). Micro studies on zombie companies are still scarce, with most of them working in Japan, a pioneering country that began to use this terminology to identify these companies (Caballero et al., 2008) and, to a lesser extent, in the United Kingdom and Spain (Urionabarrenetxea et al., 2018). These studies identify companies as zombies through their accounting ratios. However, there is still no research on the role of KAMs in distinguishing zombie companies.

The justification for using KAMs to identify zombie companies and their potential corporate insolvency analysis is based on both the recent literature on KAMs and the previous literature on the risk of financial stress. To date, KAMs studies have focused primarily on investigating whether the information mentioned by statutory auditors in key aspects of their audit processes provides utility for firms' stakeholders (Velte & Issa, 2019). Overall, mixed evidence has been found (Minutti-Mezza, 2020). On the one hand, the new extensive audit report does not increase the information on risks to investors or the quality they perceive of the audit (Bédard et al., 2019; Gutierrez et al., 2018; Lennox et al., 2019). However, several studies have suggested that KAMs provide useful information by directing users' attention to areas of the company of potential risk,

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[1] The concept of KAMS in Spain is regulated in the resolution of December 23, 2016 of the ICAC, specifically in the NIA-ES701. The objective of establishing KAMs as mandatory in audit reports is to incorporate in the report those aspects that have been of greater significance in the work of the auditor and in the way they have been resolved by the auditor. This ICAC regulation is in line with the IFTSE100 regulations that they had been using in the United Kingdom since 2013.

have expanded the credibility of the information, and have identified specific areas with potential problems for companies (Christensen et al., 2014; Moroney et al., 2020; Smith, 2019).

In line with these latest investigations by the KAMs, which support their usefulness in pointing out risks for companies, previous work already affirmed with audit reports prior to the NIA-ES-701 (which did not include KAMs) that a simple audit opinion -qualified or unqualified- (Altman et al., 2010; Laitinen & Laitinen, 2009a; 2009b; Piñeiro-Sánchez et al., 2012) and the content of the emphasis paragraphs or qualifications (Muñoz-Izquierdo et al., 2019a; 2019b; 2020) had the ability to anticipate situations of financial stress or business failure. KAMs can also serve to glimpse the level of financial health of companies subject to the new audit report (Camacho-Miñano et al., 2021). Our study is based on both lines of research, proposing that the diagnosis of a zombie company will improve just by reading the content of the audit report.

This work contributes to two lines of research in the literature: zombie companies and auditing. First, the contribution to the branch on zombie companies lies in a new measure of their detection and analysis using audit variables, in combination with financial variables. This study is the first to consider the new model report issued by the external auditor and, more specifically, the KAMs mentioned in it, along with other audit variables such as the auditing firm, the type of opinion, the emphasis paragraphs and the caveats, to identify zombie companies. Previous studies have created multidimensional indices as measures of identifying zombie companies (Urionabarrenetxea et al., 2018) but using accounting ratios. The use of the new audit report can help improve the diagnosis of zombie companies, simplifying the process of their identification by reading the KAMs.

Secondly, the contribution to the auditing branch of research lies in recognizing an additional utility of the new report, which is the identification of zombie companies. The appearance of the new extended audit report was aimed at raising the quality of audits to strengthen confidence in economic and financial information. In this way, if the KAMs and other variables in the report manage to identify the zombie companies, we will justify that the new audit reports (and, in particular, the KAMs) are able to reflect previous indications of insolvency as with the caveats in the pre-reform audit reports (Muñoz-Izquierdo et al., 2017; 2019a, b). Despite the controversy generated by the reputational risks of auditing companies when issuing certain KAMs or the possible risk of litigation for auditors who point out more risks than necessary (Velte & Issa, 2019). In doing so, we are helping the public give greater added value to the audit of accounts, helping the auditor consolidate himself as a critical element for the functioning of the market, as an independent expert in the public interest.

The remainder of the paper is organized as follows. The next section briefly contextualizes research about zombie firms and financially distressed companies. The research questions are then presented. Next section details the methods used to test our hypotheses, describes the sample and its context. The results are shown in the fourth section. Finally, the fifth section discusses and concludes the paper.

2. PRIOR LITERATURE AND RESEARCH QUESTION

We aim to use the content of audit reports, specifically KAMs, to identify zombie firms. To achieve our goal, the basics of this study are the analysis of prior research about (1) the complexity of what a zombie firm is, (2) the scarcity of studies at the microeconomic level that identify and analyze this type of companies, and (3) the usefulness of the audit report in the identification of companies with financial difficulties.

2.1. Complex conceptualization of zombie firms

"Zombie firms" is a hot research topic today due to its negative consequences on microeconomic and macroeconomic levels. Many stakeholders suffer from the effects of a situation where a firm is dealing with high indebtedness and low efficiency and profitability: from the shareholders of the business to its employees, customers, suppliers, financial institutions, markets and society, in general. While there have been many research studies about zombie firms, its trend is recently increasing.

According to prior literature, there is no clear definition of a zombie firm (Parte and Camacho-Miñano, 2020). Some authors define zombie firms as a business with an interest coverage ratio (ICR) less than one (the ratio of operating income to interest expenses) for three consecutive years (Bank of Korea, 2013). Another definition adds to the prior ratio, the age of the firm as higher than 10 years (McGowan et al., 2017a, 2017b); or if ICR lower than 1 more than two years and Tobin's q ratio lower than the median within its sector (Banerjee & Hofmann, 2020) or the comparison of ICR lower than the median and the leverage ratio higher than the median, while the medians are calculated at the industry-country-year level (Acharya et al., 2020). However, one issue is clear: the literature on zombie firms is linked to recent economic crises and could be a real problem in the coronavirus crisis we are living in today.

The term "zombie" has its origin in Japan. It emerged in the early nineteenth century, caused by the problem in the Japanese financial economy in the 1900s (Ahearne & Shinada, 2005; Bruche & Llobet, 2013; Hoshi & Kashyap, 2004; Peek & Rosengren, 2005). The first studies that began to mention this phenomenon focused on the concept of "zombie loans" (Broz & Ridzak, 2017; Bruche & Llobet, 2013; Knight et al., 2008; Kwon et al., 2015), pointing to Japanese banks as the culprits for lending financing to unreliable, unprofitable companies that are harmful to the economic sector. The survival of these unproductive enterprises hindered Japan's economic recovery. Thus, the concept of zombie enterprise is closely linked to the misallocation of bank credit, which was later developed as the model of creative destruction (Ahearne & Shinada, 2005; Atkeson & Kehoe,1995).

As San José et al., (2021) point out, the relevant literature is concentrated in a few countries: mainly Japan, China and, to a lesser extent, Canada, the United Kingdom and other European countries such as Spain and the Czech Republic. Urionabarrenetxea et al. (2016) based their study on negative net worth as a criterion for the most extreme type of zombie companies. Urionabarrenetxea et al. (2018) developed the EZ index to classify zombies according to risks and changes over time. They concluded that extreme zombie companies are everywhere in Europe, which accentuates the growing potential for research into this topic. In the case of Spain, more than 80% of negative equity companies can be considered zombies in the original sense of the definition of companies with serious liquidity problems. However, this is not a problem confined to Spain alone: it is a widespread concern throughout Europe.

2.2. Scarcity of microeconomic level studies to identify zombie firms

Over the years, some prior studies have tried to identify and analyze zombie companies in different ways. Caballero et al. (2008)'s pioneering research served to show interest in these companies and gave ideas of how these firms could impact industries or sectors of the economy. The study of the interest rates on the financial debt of Caballero's companies has served as a basis for many authors who have also tried to identify these companies. Other approaches are based on the companies' economic indicators, such as profitability, liquidity, and leverage, among other productivity measures (Albertazzi & Marchetti, 2010; Peek & Rosengren, 2005). There are also other more robust financial indicators such as those developed by Broz and Ridzak (2017) that used Z scores from the Altman index (Altman, 1968; Eidelman,1995) and low coverage of short-term debt along with net operating income (both below the sample's 25th percentile).

For Andrade and Kaplan (1998), the financial indicator that anticipate a zombie firm is the first year when the company's EBITDA is lower than financial expenses. Whitaker (1999) considers that threshold as the first year that a company's cash flow is lower than current long-term debt maturities to assess financial difficulties. Later, a small number of factors were applied in Back's (2005) study, such as age, size and group membership. The results suggest that the number of late payments was the variable with the most significant predictive capacity. For the estimation of the credit risk of Finnish companies, Laitinen (1999) uses a total of 35 variables, and 16 of them are non-financial variables related to the characteristics of the firm: age, industry, payment behavior, management and legal structure, as well as inquiries about the firm in the credit information bureau. Other authors, such as Hoshi (2006), focused on studying non-financial variables as characteristics of companies. Their results showed that the likelihood of becoming a zombie firm increases when the company is smaller, operates in non-manufacturing industries outside metropolitan areas, and has low profitability and high indebtedness.

McGowan et al. (2017) pointed out the negative consequences of zombies on the performance of non-zombies in the countries of the Organisation for Economic Co-operation and Development (OECD) due to the increase in resources invested in zombie companies since the mid-2000s in these countries. Urionabarrenetxea et al. (2016) studied negative equity firms in the EU economy as highly leveraged companies representing the most extreme type of zombies. In addition, they noted that these companies handle about 10 percent of European gross domestic productivity (GDP), which negatively influences competitiveness (i.e., low productivity of industries with a high number of zombie companies, limited entry of more efficient companies into these industries) and ethics (i.e., zombies incur moral hazard). To identify Chinese zombie companies, Liu et al., (2019) applied the methodology previously used by Caballero, but addnew variables and regressions for its improvement. Another recent study by Blažková and Dvouletý (2020), which tried to identify Czech zombie companies, used negative net worth as an indicator. Their results show that zombie companies are usually located in metropolitan areas and most likely middle-aged companies.

Although there is no consensus about a definition of zombie firms, undoubtfully, they are in financial difficulties. In many papers, they are identification factors such as negative equity or losses, accumulated and/or in the period. For this reason, in the next section, we focus on the papers that show the validity of audit report's content used to identify financially distressed firms as many zombie firms are.

2.3. Usefulness of the audit report to identify financially distressed firms

One category of non-financial variables used to predict financial distress is those related to auditing. It is commonly accepted that the auditing profession guarantees the reliability of financial statements. Auditors should identify any potential signals of financial distress to warn investors and other users of the audit report of any possibility of failure (Mutchler, 1984; Lennox, 1999). As the audit report is the sole communication mechanism between the auditor and all interested parties, it should inform about any concerns or misstatements found in the annual accounts, so it can be considered as data to be included when assessing financial distress. Prior evidence justify the use of audit data to signal useful incremental information about financial distress (Keasey & Watson, 1987; Hopwood et al., 1989; Flagg et al., 1991; McKee, 2003; Cheng et al., 2007; Kim et al., 2008; Laitinen & Laitinen, 2009; Altman et al., 2010; Piñeiro-Sánchez et al., 2013; Altman et al., 2015; Muñoz-Izquierdo, 2018; Muñoz Izquierdo et al., 2020). The seminal work of Altman and McGough (1974) was the first to examine the usefulness of financial models in assessing going concern, that is, in determining whether a company would presumably not remain in business in the following period. Keasey and Watson (1987) add variables specifically related to the audit field to general non-financial variables, such as age, management structure and the date of presentation of annual accounts, among others.

They test the importance of unqualified/qualified opinion and auditor switching, concluding that a combined model makes marginally better predictions than models with financial variables or non-financial data alone. A similar flow of research is followed by Flagg et al. (1991), which include the concerned auditor's opinion along with other financial and non-financial variables, finding the most significant predictive power in a model that combines financial data with the ongoing concern opinion and information about a dividend reduction. Later, Cheng et al. (2007) show that auditor change is a significant attribute for predicting error. Piñeiro-Sánchez et al. (2013) studies the predictive power of other auditor characteristics. They consider that the rotation of auditors, qualified reporting, and failure to comply with the deadlines for the approval and submission of financial statements present relevant differences between firms in difficulty and companies not in difficulty.

The most common factors about the use of auditing to predict financial distress are: the type of auditor's opinion (Flagg et al., 1991; Altman et al., 2010, 2015; Wilson et al., 2013), the going concern opinion –generally issued when a firm's going concern status is in doubt– (Altman and McGough, 1974; Altman et al., 2010), the number of qualified audits (Keasey & Watson, 1987; Piñeiro-Sánchez et al., 2013), auditor switching (Keasey & Watson, 1987; Altman et al., 2010), auditor size and tenure (Piñeiro-Sánchez et al., 2013) and audit qualifications (Muñoz-Izquierdo, 2018). A recent research paper justifies the use of KAMs to discriminate against financially distressed firms (Camacho-Miñano et al., 2021). Our paper adds one step more to the literature, trying to distinguish zombie firms using KAMs.

For all the reasons shown, it is necessary to identify zombie firms in order to avoid its continuity in the market. Consequently, our first research question states as follows:

Do the content of expanded audit reports, and specially KAMs, help in identifying zombie companies?

3. SAMPLE AND METHODOLOGY

3.1. Sample

We use the database of Spanish public interest entities with the obligation to disclose KAMs in their audit reports in the first year of implementation, that is, in 2017, following NIA-ES-701 (International Auditing Standard 701). We also extract their annual accounts from 2015 to 2017.

The database has been prepared manually from several sources: ORBIS BVD database, ICJCE (Institute of Auditors in Spain), IGAE (General Intervention of the State Administration) and the annual accounts published by the companies on their websites. The content of the audit reports is made up of the auditor's opinion, the emphasis paragraphs, the auditing firm name and the KAMs mentioned, and was obtained from the ICJCE database. In cases where this information was not available on this database, we have resorted to the manual search process in the annual accounts of the companies.

Our initial sample were 381 audit reports from Spanish companies at the ICJCE database. For the public interest entities (EIP), due to transparency requirements, it is mandatory to publish their audit reports. Additionally, there are also audit reports from firms that voluntarily decide to make these reports public. [23] Financial institutions were removed from the sample, as they deal with different regulatory requirements, and their structural characteristics differ considerably from those of other firms (Charitou et al., 2007). Some other firms had to be deleted as well due to missing financial data in ORBIS database to run our analyses. Sample selection criteria are summarized in Table 1.

Table 1. Sample selection criteria

Initial sample	381
(-) Financial companies	(42)
(-) Companies with missing financial data	(111)
Final sample	228

We report the characteristics of the final sample in Table 2. We use the accounting variables taken from the Altman's Z"-Score model due to its current usage, popularity and efficacy according to prior literature (Altman, 1983; Balcaen & Ooghe, 2006; Bellovary et al., 2007; Altman et al., 2017). This score is a proxy of firm's health, composed of four financial ratios:
$Z1$= working capital to total assets (WCTA),
$Z2$=retained earnings to total assets (RETA),
$Z3$=earnings before interest and taxes to total assets (EBITTA), and

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[2] The definition of "Entity of Public Interest" is found in article 15 of BOE Royal Decree 877/2015 of 2 October and in article 3 of BOE Law 22/2015 of 20 July on Audit of Accounts. By EIP we mean those companies that, due to their volume, type of activity or relevance in the country's economy, are subject to specific supervision and regulation. Among these specific regulations is the obligation to have an Audit Committee and its corresponding supervision. Among the types of entities that make up this definition we have those:
    A. Securities issuers, insurance companies and financial companies.
    B. Companies with a high volume of employees, size or whose activity is of a significant nature, i.e. of significant public importance.
    C. Other entities subject to the supervision and control regime of a public body such as the Bank of Spain (Bde) or the National Securities Market Commission (CNMV), among others.
    D. Other companies such as pension funds, banking foundations, payment institutions, electronic money institutions, etc.
Those companies that meet the above definition will have the obligation of national supervision by the CNMV, the Bde and the Institute of Accounting and Audit of Accounts (ICAC).

Z4=the book value of equity to total liabilities (BVETL).
being Z''-SCORE = 6.56*WCTA + 3.26*RETA + 6.72*EBITTA + 1.05*BVETL and its threshold is: Z'' > 2.6 – "safe" zone; 1.1 < Z'' < 2.6 – "grey" zone; Z'' < 1.1 – "distress" zone.

WCTA is a liquidity ratio that expresses the value of net current assets of a firm over total assets, and a decrease might represent a signal of viability problems, so firms with low liquidity are expected to be more financially distressed than firms with no liquidity issues. RETA displays cumulative profitability as a proportion of total assets. As noted in prior studies, profitability is negatively linked to bankruptcy, so a negative correlation between this long-term profitability measure and bankruptcy is expected. The ratio of earnings before interest and taxes to total assets (EBITTA) shows how productive a firm is in generating earnings before deducting interest and taxes, so a decline might indicate the existence of financial distress concerns. Thus, a lower profitability is hypothesized when firms are under financial distress. According to prior research, the return on assets ratio appears to be the most powerful predictor (Altman et al., 2017), as it continually outperforms other measures in assessing the risk of failure. Book value of equity to total liabilities (BVETL) captures leverage or capital structure. Shrinkages in this measure might be warning signs for financial difficulties, as it is expected that the distressed sample to be highly leveraged. BVETL measures if the value of equity gets lower than total debts.

Table 2. Descriptive statistics of the sample

	Non-Zombie sample	Zombie sample	Total sample
Number of observations	167	61	228
Z-score	8.60	4.85	7.60
Z1= WCTA	0.90	0.01	0.07
Z2= RETA	0.31	0.12	0.26
Z3= EBITTA	0.07	-0.07	0.03
Z4= BVETL	3.10	1.52	2.68
Age (in years)	42.6	43.8	42.8
Size (total assets in thousands of euros)	2,454,375	789,346.3	2,008,907
Total liabilities (in thousands of euros)	1,284,061	568,522.8	1,092,623
EBIT (in thousands of euros)	126,992.9	-15,555.2	88,855
Financial expenses (in thousands of euros)	39,335.7	32,718.5	37,565.3

The index of financial distress, Z''-score of the sample is 7.60, which means there are not distressed as the threshold for distress is lower than 2.6 However, zombie firms have high level of financial distress (4.85 vs. 8.60). Disaggregating the components of Z''-score, Z1 is tremendously lower for zombie firms, what means that those firms have almost zero liquidity. In other words, zombie firms, as with low liquidity, are expected to be more financially distressed than non-zombie firms, with no liquidity issues. Z2 is almost three times lower for zombie firms, comparing to non-zombie. It displays cumulative profitability. Non-zombie firms have less negative correlation between this long-term profitability measure and, consequently, bankruptcy is less expected for those firms. Z3 shows how productive a firm is in generating earnings before deducting interest and taxes, so negative ratio as zombie firms have (-0.07) indicates the existence of financial distress concerns. Z4 show the leverage ratio and, as it is expected, the zombie sample is highly leveraged, with lower BVETL measures. Equity values are lower than external financing.

Although all the indicators of financial distress show higher for zombie firms, the age average is similar between zombie (43.8) and non-zombie firms (42.6). For the total sample is 42.8 years, meaning that all firms have experience on their markets. The size dimension shows an average of 2 million euros in total assets, with a high difference between firms, more than three times bigger non-zombie firms comparing with zombie firms. Surprisingly, zombie firms are more than two times less indebtedness than non-zombie firms in absolute values. If we considered the level of debt compared with total assets, zombie firms have 72% of debt while for non-zombie firms is 52% of its total assets. Additionally, EBIT average is negative for zombie firms, so they cannot pay their debt's interest expenses.

3.2. Variables of the study

3.2.1. *Dependent variable*

We define ZOMBIE_ICR as the dependent variable. ZOMBIE_ICR is a dummy variable that equals 1 if the firm age is more or equal to 10 years and the firm's interest coverage ratio (ICR) is lower than 1 over three consecutive years, in line with McGowan et al. (2017a, 2017b). We have chosen this measure as it is the most accurate definition using available accounting data. Others need market data and external information, not considered in the firms' financial statements. The ICR is defined as earnings before interest and taxes (EBIT) divided by financial expenses.

A binary variable is commonly used as the dependent variable in the default literature (Luoma & Laitinen, 1991; Laitinen, 1999). We consider ICR as the determinant for identifying zombie firms as those, many of them highly indebtedness, which cannot pay their financial expenses, mostly debt's interest, with the earnings obtained in the period from its operating activities. It is a financial ratio that measures a company's ability to make interest payments on its debt in a timely manner. In other words, it measures the margin of safety a company has for paying interest on its debt during a given period. Sometimes this ratio is also called the times interest earned (TIE) ratio. Lenders, investors, and creditors often use this formula to determine a company's riskiness relative to its current debt or for future borrowing—the higher value of this ratio, the better although the ideal ratio may vary by industry.

3.2.2 *Independent variables*

The zombie predictors or independent variables are summarized in Table 3. For their calculation, we extracted data from the Orbis BVD database and ICJCE database. The main independent variable is the ZSCORE as a proxy of financial distress (see Altman & Sabato, 2007; Altman et al., 2017). This variable has been explained in the sample section. Additionally, we have considered FIRMAGE as the total number of years from its founding. FIRMSIZE is the logarithm of total assets. Related to INDUSTRY, we have considered only three categories, according to its NACE code: 0 for construction and real estate; 1 for manufacturing, energy and natural resources and 2 for service companies.

As this study also explores the zombie identification using external audit information, we select the following audit explanatory variables: auditor size (AUSIZE), being equals 0 for Big-4 audit companies and 1 otherwise. The audit opinion (AUOPI) is a binary variable that takes the value of 0 if the opinion issued is unqualified, and 1 if it is qualified. On the one hand, an opinion is unqualified when the auditor determines that financial statements give a true and fair view in accordance with the reporting framework used for the preparation of the annual accounts. On the other hand, the auditor issues a qualified opinion if any significant modification or reservation is

found in the financial statements. Thus, a qualified report is issued (i) when the financial statements are materially misstated in a particular account balance, class of transaction or disclosure that does not have pervasive effect on the financial statements, or (ii) when the auditor is unable to obtain evidence regarding balances, transactions or disclosures without pervasive effect on the financial statements. We expect the likelihood of being zombie and the qualified opinions to move in the same direction, so that a qualified opinion will lead to a financial distress situation and consequently to being zombie.

Additionally, auditors might also include emphasis of matter paragraphs when it is necessary to indicate significant uncertainties but disclosed appropriately in the notes to financial statements. These paragraphs do not qualify the auditors' opinion. We distinguish two types of matter paragraphs: EMPGC, which equals 1 if there is an emphasis paragraph of going concern in the firm's audit report, and EMPOTHER, which takes the value of 1 in case of existence of emphasis paragraph of other reasons but going concern. Bédard et al. (2019) find that when annual reports include a going concern uncertainty disclosure, an emphasis of matter paragraph in the auditor's report may have incremental negative share value effects in contrast to when the uncertainty disclosure is not accompanied by this paragraph. For this reason, we consider relevant to examine the impact of emphasis paragraph on zombies identification, differentiating between going concern and other emphasis paragraphs.

Another independent variable is TOTALKAM, which displays the number of KAMs disclosed in the reports. As mentioned before, this variable represents the total number of individual KAMs for each firm in the sample, reported in the annual audit opinions of each firm, consistently with Sierra-García et al. (2019) and Lennox et al. (2019). Recent studies show a relation between the number of KAMs and specific client structural complexity (Ferreira & Morais 2019; Pinto & Morais 2019) and client leverage and reported losses (Sierra-García et al. 2019).

In order to test the predictive ability each KAM disclosure separately, we have developed an 11-item codification, detailed in Table 3, based on the topic typology provided by the ICJCE. The codification consists of 11 dummy independent variables, that relate to accounting elements mentioned in the KAM paragraphs, recognition and valuation comments, significant accounting transactions, legal and regulatory requirements, going concern KAMs, and other issues in the firm worth disclosed in the KAMs section.

Table 3. Definition of independent variables

Variable name		Explanation	Variable acronym
Z-SCORE		It is the value of the Z''-score by Altman in continuous value.	ZSCORE
FIRM AGE		Continuous variable as the total number of years from its founding.	FIRMAGE
FIRM SIZE		Continuous variable measured the logarithm of total assets.	FIRMSIZE
FIRM INDUSTRY		Dichotomous variable with a value of 0 for construction and real estate; 1 for manufacturing, energy and natural resources and 2 for service companies	INDUSTRY
AUDIT FIRM SIZE		Dummy variable with a value of 0 if the audit firm is a Big 4 (KPMG, PWC, Deloitte or EY), and 1 otherwise.	AUSIZE
AUDIT OPINION		Dummy variable with a value of 1 if the audit report is qualified (fail), and 0 if it is unqualified (pass).	AUOP
TYPE OF PARAGRAPH	Going concern uncertainty	Dummy variable with a value of 1 if the audit report has a going concern uncertainty paragraph, 0 otherwise.	EMPGC
	Other emphasis of matter	Dummy variable with a value of 1 if the audit report has an emphasis of matter paragraph different as going concern, 0 otherwise.	EMPOTHER
TOTAL NUMBER OF KAMS		The number of KAMs disclosed in the audit report of each firm	TOTALKAM
KAM CODIFICATION		Dummy variable with a value of 1 if the audit report has KAMs about non current assets, 0 otherwise.	NCAKAM
		Dummy variable with a value of 1 if the audit report has KAMs about current assets, 0 otherwise.	CAKAM
		Dummy variable with a value of 1 if the audit report has KAMs about liabilities, contingencies, benefit plans and taxes, 0 otherwise.	LIATAXKAM
		Dummy variable with a value of 1 if the audit report has KAMs about legal, regulatory compliance and contractual obligations, 0 otherwise.	LEGALKAM
		Dummy variable with a value of 1 if the audit report has KAMs about accruals, deferrals and revenue recognition, 0 otherwise.	ISKAM
		Dummy variable with a value of 1 if the audit report has KAMs about related parties transactions, 0 otherwise.	RELPARKAM
		Dummy variable with a value of 1 if the audit report has KAMs about unusual and significant transaction, 0 otherwise.	UNSIGKAM
		Dummy variable with a value of 1 if the audit report has any going concern KAMs, 0 otherwise.	GCKAM
		Dummy variable with a value of 1 if the audit report has KAMs about business combinations, 0 otherwise.	BCKAM
		Dummy variable with a value of 1 if the audit report has KAMs about information technology systems, 0 otherwise.	ITSKAM
		Dummy variable with a value of 1 if the audit report has KAMs about other items, 0 otherwise.	OTHERKAM

3.3. Logistic regression model

We use the logistic regression methodology to ask our research question. This methodology is commonly applied in distress studies, as it seems to fit well with the characteristics of the default prediction issue (Ohlson, 1980; Laitinen & Laitinen, 1998; Balcaen & Ooghe, 2006; Acosta-González & Fernández-Rodríguez, 2014).

We run 3 models, from the model 0, without auditing report information to model 2, the most disaggregated one with dummy KAMs, as shown in Table 3. Model 0 is used to test if there is an association between zombie firms and our financial distress proxy, ZSCORE. Our Model 0 is displayed as follows:

Model 0: $ZOMBIE\_ICR = \beta_0 + \beta_1 ZSCORE + \beta_2 FIRMAGE + \beta_3 FIRMSIZE + i.INDUSTRY + \mu_{it}$

The coefficient β_1 captures the relation between zombie firms and the level of financial difficulties. Therefore, β_1 will be negative and significant, as the lower the ZSCORE is, the higher financial distress the firm has.

Model 1 examines the relation between zombie firms, financial distress and the generic variable included in the firm's audit report (audit firm's size, audit opinion, the existence of emphasis of matters with going concern or other issues and the total number of KAMs.

Model 1: $ZOMBIE\_ICR = \beta_0 + \beta_1 ZSCORE + \beta_2 FIRMAGE + \beta_3 FIRMSIZE + \beta_4 AUSIZE + \beta_5 AUOP + \beta_6 EMPGC + \beta_7 EMPOTHER + \beta_8 TOTALKAM + i.INDUSTRY + \mu_{it},$

where the coefficients β_1 to β_3 capture the relation explained in model 0. If there is a link between zombie firms and the content of its audit report, some or all coefficient from β_4 and β_8 will be positive and significant. This shows the interconnection we would like to test between zombie firms and their audit reports.

Lastly, Model 2 examines the relation between individual types of KAMs and zombie firms. It is similar to model 1 but substituting the TOTALKAM variable for each individual KAMs, as 11 dummy categories, already explained in Table 3.

Model 2: $ZOMBIE\_ICR = \beta_0 + \beta_1 ZSCORE + \beta_2 FIRMAGE + \beta_3 FIRMSIZE + \beta_4 AUSIZE + \beta_5 AUOP + \beta_6 EMPGC + \beta_7 EMPOTHER + \beta_8 NCAKAM + \beta_9 CAKAM + \beta_{10} LIATAXKAM + \beta_{11} LEGALKAM + \beta_{12} ISKAM + \ldots. + \beta_{18} OTHERKAM + i.INDUSTRY + \mu_{it},$

where NCAKAM, CAKAM, LIATAXKAM, LEGALKAM, ISKAM… OTHERKAMRDO, are the 11 KAM types described in Table 3, according to ICJCE database. For our purposes, if any β_8-β_{18} coefficients is positive and significant, it means that there is a link with zombie firms.

All the models include industry dummy variables. The p-values are calculated using statistics estimated from robust standard errors clustered by firm.

4. RESULTS

4.1. Summary statistics

Table 4 provides descriptive statistics of firms and KAMs disclosed in the audit reports of our sample firms for 2017. Panel A shows the industry distribution of our sample firms. The most frequently represented industry in our final sample is "service companies" (47.37%), followed by "Manufacturing, energy and natural resources" (33.77%) and "Construction and real state" (18.66%). The portion is similar between zombie and non-zombie firms. Panel B displays the distribution of audit firms. Over two-third of our sample firms are audited by Big4 firms. For both, zombie and non-zombie firms, Big 4 companies are the most common audit firms. Panel C displays the distribution of audit opinion of sample firms. Only 19 firms have going concern emphasis of paragraph, being the most for zombie firms (15) versus non-zombie firms (4). Related to the existence of other emphasis of matter, only 5 zombie firms and 7 non-zombie firms have one, as display in Panel D. Panel E shows the number of KAMs disclosed range from 1 to 6. The mean number of KAMs disclosed decreased over our sample period was 1.95 in 2017, although this mean is higher for zombie firms comparing with non-zombie firms, being its standard deviation also higher. Consequently, the most frequent number of KAMs in our sample is two (42.54 %). 35.09% of our sample has only one KAM in their audit report and 16.67% firms have three KAMs. Only 5.71% of the sample has more than three KAMs.

Table 4. Sample Descriptive Statistics

	Non-zombie sample	Zombie sample	Total sample
Panel A. Industry distribution			
Construction and real state	31 (13.6%)	12 (5.26%)	43 (18.86%)
Manufacturing, energy and natural resources	57 (25%)	20 (8.77%)	77 (33.77%)
Service companies	79 (34.65%)	29 (12.72%)	108 (47.37%)
Panel B. Auditor distribution of sample firms			
Big 4 audit firm	119 (52.19%)	36 (15.79%)	155 (67.98%)
Non-Big 4 audit firm	48 (21.5%)	25 (10.96%)	73 (32.02%)
Panel C. Audit opinion distribution of sample firms			
Unqualified audit opinion (pass)	167 (73.25%)	59 (25.88%)	226 (99.12%)
Qualified audit opinion (fail)	0 (0%)	2 (0.88%)	2 (0.88%)
Panel D. Type of paragraph			
Existence of going concern uncertainty	5 (2.19%)	15 (15.6%)	19 (21.4%)
Non-existence of going concern uncertainty	162 (71.05%)	47 (20.61%)	209 (91.67%)
Existence of other emphasis of matter	7 (3.04%)	5 (2.19%)	12 (5.26%)
Non-existence of other emphasis of matter	160 (70.18%)	56 (24.56%)	216 (94.74%)
Panel E. Total number of KAMS			
1	58 (25.88%)	22 (9.65%)	80 (35.09%)
2	72 (32.58%)	25 (10.96%)	97 (42.54%)
3	31 (13.60%)	7 (3.07%)	38 (16.67%)
4	5 (2.19%)	5 (2.19%)	10 (4.39%)
5	1 (0.44%)	1 (0.44%)	2 (0.88%)
6	0 (0%)	1 (0.44%)	1 (0.44%)
Mean of Total KAMs	1.92	2.03	1.95
St.d. of Total KAMs	0.84	1.11	0.92
TOTALS	**167 (73.25%)**	**61 (26.75%)**	**228 (100%)**

4.2. Pearson correlations

Table 5 reports the Pearson correlations among the dependent variable (*ZOMBIE_ICR*) and the independent variables used to ask our research question. Generally, the correlations are statistically significant but relatively low. The dependent variable is correlated with Z''-Score with negative sign due to the inverse relation of the financial distress score used; with the negative result (profit and loss of the period) and with the existence of going concern KAM. There are several significant correlations in Table 5 between the variables included in the regression models, but no evidence multicollinearity is a problem.

Table 5. Pearson Correlation Matrix

Variable	ZOMBIE-ICR	INDUSTRY	FIRMAGE	FIRMSIZE	ZSCORE	PLPERIOD	EBIT	FINEXP	TOTALK AM
ZOMBIE-ICR	1.000								
INDUSTRY	-0.0051	1.000							
	0.9393								
FIRMAGE	0.0178	**-0.1358**	1.000						
	0.7892	*0.0405*							
FIRMSIZE	**-0.1250**	**-0.1735**	**0.3302**	1.000					
	0.0596	*0.0086*	*0.000*						
ZSCORE	**-.1952**	-0.1010	0.0517	-0.0137	1.000				
	0.0031	*0.1285*	*0.4374*	*0.8371*					
PLPERIOD	**-0.1276**	0.0114	**0.1383**	**0.2346**	0.1042	1.000			
	0.0543	*0.8646*	*0.0054*	*0.0004*	*0.1167*				
EBIT	**-0.1528**	0.0445	**0.1837**	**0.3599**	0.0844	**0.8530**	1.000		
	0.0210	*0.5034*	*0.0054*	*0.000*	*0.2043*	*0.0000*			
FINEXP	-0.0170	-0.027	**0.2753**	**0.3762**	-0.0604	**0.2406**	**0.4613**	1.000	
	0.7988	*0.6864*	*0.000*	*0.000*	*0.3638*	*0.0002*	*0.0000*		
TOTAL KAM	0.0563	-0.0099	**0.1196**	**0.1998**	**-0.1716**	-0.0097	-0.0243	-0.0068	1.000
	0.3971	*0.8816*	*0.0714*	*0.0024*	*0.0094*	*0.8841*	*0.7155*	*0.983*	

We report p-values below each Pearson coefficient and show the probability of observing this correlation under the null hypothesis that the correlation is zero. Additionally, we tested the correlations of the classification of KAMs per type and there are no multicollinearity issues among them (untabulated). Only going concern KAM (GCKAM) is significantly correlated with our independent variable.

4.3. Logistic regression models.

Table 6 presents the results of estimating the three regression models to answer our research question. The models estimate the interconnections between the presence of zombie firms, the content of their audit report and the risk of financial distress. All the models, as mentioned in section 3.3, use the dummy variable ZOMBIE_ICR as dependent one. Model 0 represents the baseline model, with the level of financial distress as the main independent variable (ZSCORE) plus some firm's characteristics as control variables (age, size and industry). Then, we estimate Model 1 enlarging Model 0 by adding auditing variables. Model 2 replaces the number of total KAMs with the 11-item codification of the individual KAM topics, from KAMs related to non-current assets (NCAKAM) valuation to other KAMs (OTHERKAM). For all models, the goodness of fit, the Prob > chi2, and the Wald chi-squared test are significant. The VIF values[4] show the inexistence of multicollinearity between independent variables.

Model 0 is significant and explain 10.38% (R square). Results show a negative and significant relation between the presence of Zombie firms (ZOMBIE_ICR) and financial distress (ZSCORE), indicating that the existence of zombie firm is associated with a low Z''-Score. Thus, the greater the level of financial distress risk, the higher the possibility of a firm to be considered zombie. This finding is consistent with our expectations, and it is in line with Urionabarrenetxea et al. (2016) and Blažková and Dvouletý (2020). Additionally, firm size (FIRMSIZE) is also related to zombie firms in a significant and negative way. Smaller firms are associated with higher chances of being zombie in our sample.

Table 6. Logistic Regression Models

	Model 0	Model 1	Model 2
Dependent variable	ZOMBIE_ICR	ZOMBIE_ICR	ZOMBIE_ICR
ZSCORE	**-0.195****	**-0.154***	-0.119
	(-3.09)	(-2.42)	(-1.93)
FIRMAGE	0.00494	0.00451	0.000581
	(0.92)	(0.83)	(0.09)
FIRMSIZE	**-0.465***	-0.284	-0.115
	(-2.49)	(-1.40)	(-0.47)
1.INDUSTRY	-0.0996	-0.239	-0.280
(manufacturing)	(-0.22)	(-0.54)	(-0.60)
2.INDUSTRY	-0.399	-0.455	-0.752
(services)	(-0.91)	(-1.03)	(-1.57)
AUSIZE		0.314	0.380
		(0.82)	(0.88)
AUOP		0	0
		(.)	(.)

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[4] A diagnostic test for multicollinearity through the estimation of the variance inflation factor (VIF) coefficients for all regressions was carried out. The VIF coefficients are always below the threshold of 10 (Kennedy, 2008), suggesting that multicollinearity does not affect the analyses.

	Model 0	Model 1	Model 2
Dependent variable	*ZOMBIE_ICR*	ZOMBIE_ICR	ZOMBIE_ICR
EMPGC		**1.440***	**2.130*****
		(2.26)	(3.47)
EMPOTHER		0.828	0.925
		(1.35)	(1.46)
TOTALKAM		0.0860	
		(0.44)	
NCAKAM			0.103
			(0.30)
CAKAM			0.356
			(1.07)
LIATAXKAM			-0.204
			(-0.41)
LEGALKAM			-0.0932
			(-0.15)
ISKAM			-0.310
			(-0.71)
RELPARKAM			**-2.459***
			(-2.30)
UNSIGKAM			0
			(.)
GCKAM			**2.283***
			(3.19)
BCKAM			0
			(.)
ITSKAM			-0.164
			(-0.10)
OTHERKAM			0
			(.)
INTERCEPT	2.629**	1.060	0.239
	(2.58)	(0.87)	(0.16)
No. observ.	228	226	215
Pseudo R-sq.	0.1038	0.1309	0.2174
Wald chi2	**0.0038***	**0.0181***	**0.0020***
VIF of the model	3.64	3.66	2.64
t statistics	in parentheses		
* p	p<0.001		

When we add the basic content of firms' audit report, Model 1 is also significant at 5% and explain 13.09%. It means that audit report increases the predicted power of our model. However, only the existence of going concern paragraph (EMPGC) is significant and negative. When a company has this kind of emphasis of matter, there is more probability to be zombie firm.

Model 2 in Table 6 examines whether individual types of KAMs differ in their contribution to be zombie firm. This model has the highest R-square (21.74%), suggesting that identifying KAMs by nature (individual types) enhances the explanatory power of the presence of zombie firm over simply the number of KAMs or the absence of audit report data. The results show that the existence of a paragraph related to going concern in the audit report (EMPGC), and two specific KAMs, one in positive and other in negative, are significantly related to zombie firms. Interestingly, the proxy of financial distress is not significant in Model 1 and 2, when the content of audit report is introducing in the models. This finding supports Gutierrez et al. (2020), among others, who show going concern opinions provide incremental information in the prediction of corporate defaults. Another interesting result is that the inexistence of KAMs about related parties is also a conditioning of zombie firms. This could mean that companies belonging to a group have less probabilities to be zombies.

5. CONCLUSION AND IMPLICATIONS

This paper aims to investigate empirically the extent to which the audit data included in the audit report identifies zombie firms. Specifically, this study focuses on whether the specific content of the audit report disclosures as KAMs can identify a zombie firm. Starting from a dataset of 335 Spanish firms, manually created compiling financial, audit and legal information from two data sources: ORBIS Bureau Van Dijk database and ICJCE database. For the definition of a zombie firm, we have chosen that related to accounting data, extracting easily from their annual reports; that is, a dummy variable that equals 1 if the firm aged more or equal to 10 years and with an interest coverage ratio (ICR) lower than 1 over three consecutive years in line with McGowan et al. (2017a, 2017b). The ICR is defined as earnings before interest and taxes (EBIT) divided by financial expenses.

For independent variables, we have firstly tested a well-validated proxy of financial distress, Z''-Score of Altman. The existence of financial distress is a factor to define a zombie firm. The lower the financial distress is, the higher the probability to be zombie. However, the content of the audit report, in the way of going concern, is a substitute of financial distress. Consequently, our results show that the use of KAMs lead to identify zombie firms. Our results highlight the benefits of including auditing report information. Similarly, our evidence demonstrates the reliability and significant prediction power of the disclosure in the audit report related to going concern uncertainties. This result goes in line with Camacho-Miñano et al. (2021) and Muñoz-Izquierdo et al. (2020) that highlight the relevance and utility of audit reports to identify financial distress. Moreover, our findings also suggest that the belonging to a group of firms contribute to not be a zombie firm.

This paper contributes to prior literature in several ways. First, we confirm the interconnection between high financial distress and zombie firms. Second, we provide an easy way to identify zombie firms reading the first pages of their annual reports, checking if firms have going concern advices, in the way of emphasis paragraph or KAM. Moreover, it is difficult to be a zombie firm if its audit reports have related parties KAMs. Third, this work contributes to the line of research that uses both financial and non-financial factors for anticipating zombie firms. Finally, our results might have relevant implications for practice. For managers, this study highlights the importance of the audit report, a quick and accessible tool to look at when trying to anticipate a financial distress situation (Muñoz-Izquierdo et al., 2020) but also the recognition of zombie firms. With the existence of audit report disclosures related to going concern (emphasis paragraph or KAM) and not related parties KAM, this might represent certainties to be a zombie firm. Also, for corroborating the role of regulators and auditors, due to the current international auditing environment, where regulation is changing worldwide in order to increase auditor's transparency through a more informative audit report.

This study has some limitations that must be acknowledged. We use a one-year sample of Spanish firms. These firms may also have special characteristics due to the institutional and legal context that might impair the generalization of the results. In further studies, these models can be replicated in other contexts for comparison purposes. Our study should be also extended to more year, to check the validity of our results along time.

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