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Does the corporate governance index matter for company zombification?

Rayenda Khresna Brahmana
School of Economics, Finance, and Accounting, Coventry University, Coventry, UK, and
Doddy Setiawan
Faculty of Economics and Business, Universitas Sebelas Maret, Surakarta, Indonesia

Abstract

Purpose – This study investigates how the quality of corporate governance practices reduces the likelihood of firms becoming Zombie companies. By developing a Corporate Governance Index (CGI) based on 52 criteria from the regulatory framework, the hypothesis is tested that companies with higher CGI scores are less prone to becoming Zombie companies. The study aligns with the agency theory framework, highlighting the significance of effective governance in mitigating financial distress and preventing firms from becoming Zombies.

Design/methodology/approach – The study uses a sample of 3,051 listed Indonesian firms from 2014 to 2022, excluding financial and utility companies. Data were sourced from the Bursa Indonesia website, focusing on annual reports. Continuous variables were winsorized at the 1st and 99th percentiles. The analysis involves developing a CGI tailored to the Indonesian context and examining its impact on the likelihood of firms becoming Zombie companies. Endogeneity concerns are addressed to ensure robustness. Post-hoc analyses investigate the roles of political connections and family ownership in the firm's propensity to become Zombie firms.

Findings – The results demonstrate that higher CGI scores are associated with a reduced likelihood of firms becoming Zombie companies, supporting the agency theory. Post-hoc analysis reveals that political connections and family ownership significantly contribute to a firm's Zombie status. However, the influence of CGI remains crucial regardless of these factors. The findings are consistent with the literature, emphasizing the importance of effective corporate governance in preventing Zombification.

Research limitations/implications – The study contributes to the academic literature by highlighting the importance of using a governance index to assess the impact of governance practices on firm dynamics. It highlights the relevance of corporate governance quality in understanding and mitigating Zombie theory. The research suggests further investigation into the role of CGI in helping companies transition from Zombie status to financial health and exploring the influence of upper-echelon variables on the CGI-Zombieness relationship.

Practical implications – From a practical standpoint, the findings advocate for the enhancement of control and monitoring mechanisms in firms, particularly regarding debt risk-taking decisions. Policymakers are encouraged to institutionalize the use of governance indices to evaluate firm performance. The study suggests extending such regulations to non-listed firms and SMEs to prevent the proliferation of Zombie companies. Effective governance practices are crucial for mitigating risks associated with political connections and family ownership.

Originality/value – This study provides a fresh perspective on the impact of the Corporate Governance Index on firm Zombieness within the Indonesian context. By tailoring the CGI to the specific regulatory framework, it offers reliable insights into the role of governance quality in preventing firms from becoming Zombies. The study bridges a gap in the literature by linking agency theory with Zombie theory, emphasizing the necessity of effective control and monitoring to avoid financial distress. The research highlights the pivotal role of corporate governance, even in the presence of political connections and family ownership.

Keywords Corporate governance, Zombie companies, Governance index, Agency theory

Paper type Research paper

1. Introduction

"Zombie companies" (Hereafter Zombie) refer to businesses on the edge, relying heavily on bank loans and government subsidies to avoid bankruptcy (Caballero *et al*., 2008; Fukuda and Nakamura, 2011; Kane, 1987). The zombies continue to operate despite being unable to cover

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interest expenses from their core earnings, merely to fulfill their going-concern obligations and reputations (Veganzones and Severin, 2023; San-Jose *et al*., 2022; Kane, 1987). These Zombies are burdened by heavy debt or stand on the brink of insolvency due to highly inefficient and poor decision-making (Ahearne and Shinada, 2005). They are distinct from distressed companies in the sense that Zombies persist in operation largely due to retained cash and income, external financial support, or lenient borrowing, with little prospect for turnaround.

We argue that weak corporate governance is a primary driver of "zombification." Extensive literature in accounting and finance posits that weak governance often leads to declining firm performance (Yousaf *et al*., 2022; San-Jose *et al*., 2022; Singh and Davidson, 2003; Jensen and Meckling, 1976). This is largely attributed to the principals' inadequate control and monitoring mechanisms, allowing underperformance to persist unchecked (the agency problem). Information asymmetry further exacerbates the issue, making it challenging to determine whether management actions add value (Renders *et al*., 2010; Zattoni *et al*., 2020). Entrenched management practices worsen this problem (Zerni *et al*., 2010; Antounian *et al*., 2021), often trapping firms in cycles of inefficient debt management (Tut, 2023) and higher borrowing costs (Ghouma *et al*., 2018), which collectively push them further into "zombie" status (San-Jose *et al*., 2022).

Zombification, however, differs fundamentally from conventional financial distress. Rather than being a temporary period of financial hardship, it represents a chronic inability to recover, even with external support (San-Jose *et al*., 2022; Caballero *et al*., 2008; Ahearne and Shinada, 2005). This distinction raises critical questions about whether governance practices that are effective in addressing financial distress can also mitigate zombification. Furthermore, while strong governance is generally theorized to reduce agency costs, the specific dimensions of governance that influence this mechanism remain unclear, particularly in the context of zombification.

Building on those theoretical and empirical arguments, investigating stronger corporate governance practices can mitigate the risk of zombification is essential. We further examine the impact of the quality of corporate governance by probing the effect of each dimension of corporate governance, such as "Rights of Shareholders," "Equitable treatment of shareholders," "Role of Stakeholders," "Disclosure and Transparency," and "Responsibility of the board." Prior research has analyzed several governance attributes that significantly affect firm performance outcomes, like risk management (Mathew *et al*., 2018), financial stability (Jones, 2023), and reputation enhancement (Velte, 2023). However, rarely found research examines the relationship between corporate governance index and Zombie companies, despite several attempts made by San-Jose *et al*. (2022) (using board composition and structure), Fang *et al*. (2020) (board diversity), and Veganzones and Severin (2023 (managerial ownership).

We further explore this issue by examining the contextual "channel effects" of sectoral dynamics, political connections, and family ownership, which may influence how governance quality impacts zombification. The argument is that governance practices are not isolated but shaped by these factors. For example, political connections may offer zombie firms access to resources, but they often come with compromised governance standards. Similarly, family ownership, common in many emerging economies, can lead to entrenchment, reducing accountability and prolonging financial distress (Perwitasari *et al*., 2022; Dinh and Calabrò, 2019; Chen and Nowland, 2010). This study addresses these contextual factors as an additional contribution to the literature on zombification.

In sum, this research investigates the effect of the quality of corporate governance practices on the zombification of firms. Following the literature, we take CGI as the proxy of the quality of governance practices for two reasons (Connelly *et al*., 2012; Siddiqui, 2015): (1) it assesses the holistic insight of best governance practices, and (2) it allows for consistent comparisons across firms and industries by standardizing governance quality through indexation. We argue that CGI offers additional insights into the zombie literature by highlighting how a good quality of governance practice may prevent zombification and promote long-term viability.

This study addresses the gap by proposing a comprehensive set of 52 governance items. These attributes are scored within an index (Corporate Governance Index/CGI) framework aligned with Indonesian regulatory standards, consisting of rights of shareholders, equal treatment of shareholders, the role of stakeholders, disclosure and transparency, and board responsibilities.

Indonesia is an ideal research setting to validate our framework and test the hypothesis due to several notable observations. Firstly, similar to other nations, there has been a rise in Zombie companies in Indonesia, particularly following the COVID-19 pandemic. The IMF (2023) highlights these companies as a threat to Indonesia's economic progress, a trend mirrored in other nations like Japan (Ahearne and Shinada, 2005), Spain (Urionabarrenetxea *et al*., 2018), Portugal (Carreira *et al*., 2022), and China (Jiang *et al*., 2017). Anecdotal evidence from the Center of Economic and Law Studies suggests that similar to other developing countries, Indonesia's weak governance mechanisms contribute to the proliferation of Zombie companies.

Additionally, Indonesia's deficient governance structure, inherent to its status as a developing nation, increases agency costs (Tanjung, 2020). Elements such as governance enforcement, family involvement, and political ties hinder Indonesian firms' separation of ownership and control (Leuz and Oberholzer-Gee, 2006; Claessens *et al*., 2000). Consequently, the agency cost is unsurprisingly a significant concern, worsened by the poor protection for the shareholders (Claessens *et al*., 2000). This situation may lead to the notion that Indonesia, like other developing nations, has substandard governance practices (ADB, 2017; Tanjung, 2020).

In short, this research aims to investigate how the quality of corporate governance practices, as measured by the Corporate Governance Index (CGI), affects the likelihood of companies becoming Zombie entities. The hypothesis states that companies with poor governance practices (low CGI scores) are more likely to become Zombie than those with better governance practices (high CGI scores). We test the hypothesis using data from 339 Indonesian listed companies from 2014 to 2022. Our robust panel regressions reveal that CGI is negatively associated with Zombie. It suggests that firms with higher CGI scores are less likely to be Zombies. Further, the robustness checks confirm the results, affirming the hypothesis.

The study enriches the literature in several ways. First, we enrich the literature by showing that CGI is negatively associated with the Zombie. This finding reinforces that corporate governance is crucial in maintaining a company's financial health and viability. Additionally, unlike previous research (e.g. San-Jose *et al*., 2022), we emphasize the importance of the quality of governance practices as a decisive factor in determining the zombie probabilities. Second, we provide insight into the literature that the governance dimensions, like "Rights of Shareholders," "Equitable Treatment of Shareholders," and "Responsibility of the Board," are important qualities for zombie companies to exit from the situation. Interestingly, the quality of "Role of Stakeholders" and "Disclosure and Transparency" have a trivial impact on zombification. Third, we expand the literature by introducing a more comprehensive assessment of governance practices within the context of Zombie companies. This index enables a thorough evaluation of how the quality of corporate governance practices influences the likelihood of a company becoming a Zombie. Moreover, unlike current literature (e.g. Jiang *et al*., 2017; San-Jose *et al*., 2022), we utilize comprehensive measures of Zombie companies to demonstrate the robustness of our findings. Additionally, we reveal that political connection and family ownership have failed to moderate the impact of corporate governance quality on zombification.

This study is outlined as follows. The next section introduces Indonesia's institutional background. Section 3 reviews the literature and develops the hypothesis. Section 4 describes the research design and methodology. The results and findings are in Section 5. Lastly, Section 6 concludes and offers the implications and suggestions for future research.

2. Research rationalization on institutional background

2.1 The background of Indonesian Zombie companies

The frequent economic shocks in the 2000s led to systemic risk (Acemoglu *et al.*, 2015), impairing firms' financial sustainability. Consequently, the companies rely on gearing to adjust to the negative shocks. However, the agency cost in this risk-shifting behavior of gearing results in Zombie companies (Caballero *et al.*, 2008; Urionabarrenetxea *et al.*, 2018). Theoretically, without proper control and monitoring of how managers take loans, companies become heavy debt burdens, a characteristic of Zombie (Kane, 1987).

In Indonesia, the COVID-19 pandemic has highlighted the presence of Zombie companies to policymakers (IMF, 2023). The government responded with numerous economic packages to support struggling firms during this period. Unfortunately, the moral hazard among these companies increased the likelihood of defaulting on loan payments (San-Jose *et al.*, 2022; Kane, 1987). Companies took on greater financial risks, believing they would not face repercussions for risky behavior due to government assistance (San-Jose *et al.*, 2022; Kane, 1987). Given that COVID-19 reduced cash inflows, these risk-taking behaviors threatened their ability to repay the debt.

The COVID-19 pandemic served as a wake-up call for the Indonesian government, admitting zombie companies had long been present in Indonesia, a consequence of inadequate institutional enforcement and strong political connections (Arniati and Situmorang, 2023; IMF, 2023). For instance, government support for State-Owned Enterprises (SOEs) keeps them operational despite poor performance. Furthermore, politically connected firms can more easily evade bankruptcy and financial distress due to their ties with politicians. This highlights the urgent need to eliminate the Zombies in Indonesia for a healthier economic landscape, especially through better corporate governance.

2.2 Corporate governance index over various governance factors

This subsection does not claim that CGI is superior to individual governance items. Instead, it seeks to justify the use of CGI in influencing the likelihood of Zombie. Comparing CGI to individual governance measures is akin to choosing between oranges and apples for a better diet. We defer the debate on which option is superior to future research.

While the debate regarding CGI versus individual governance attributes is not extensive, the corporate governance literature predominantly focuses on using single governance attributes, such as board size, board diversity, board characteristics, ownership structure, ownership identity, ownership expropriation, and duality, assessing their impact on firm performance (Goel *et al.*, 2022; Yousaf *et al.*, 2022). However, the findings from these studies vary.

For example, various studies indicate a positive financial influence of including outside directors on the board (Nicholson and Kiel, 2007). Conversely, some studies contend outside directors fail to advance shareholders' financial interests (Tejerina-Gaite and Fernández-Temprano, 2021). Additional research explores the balance between external monitoring, directors' expertise, and board size. Nevertheless, international findings from Columbia and Ghana (Orozco *et al.*, 2018; Darko *et al.*, 2016) suggest a negative impact of board size on firm performance. In Indonesia, Darmadi (2016) suggests that ownership structure negatively affects firm performance, while Shahrier *et al.* (2020) indicate a positive relationship.

Bøhren and Ødegaard (2012) argue that linking corporate performance to a specific aspect of corporate governance may not accurately reflect the true relationship unless other governance aspects are considered. This argument prompted several researchers to develop a single governance index—a scorecard measuring a firm's corporate governance across various dimensions. For instance, governance indices have been created for Europe and the United Kingdom (Bauer *et al.*, 2008), Germany (Drobetz *et al.*, 2004), Korea (Black *et al.*, 2006), the United States (Gompers *et al.*, 2003), and numerous emerging markets (Klapper and Love, 2004). These indices assess the connection between a firm's overall corporate governance score and its corporate performance. In most instances, these studies identify positive and significant relationships.

According to Connelly *et al*. (2012), the measure has distinct advantages over evaluating individual governance attributes. First, it reflects the actual practices implemented by firms, serving as a quality gauge that indicates whether these practices are inadequate (poor), compliant with legal standards (good), or aligned with the best practices (best). Second, this measure is grounded in economic and financial research, offering a comprehensive overview of governance practices based on empirical findings and theoretical frameworks. The index format enables comparisons between companies regarding their governance practices.

Furthermore, the CGI is based on specific governance attributes from annual reports rather than fixed metrics, allowing it to capture the dynamic nature of governance practices over time. Unlike the single attribute (e.g. board size, board meeting, board diversity, and others), CGI's items can vary annually with compliance and governance action changes, providing a more comprehensive view of governance practices' quality. For instance, consider items such as (item no. 4) Do board members hold more than 25% of outstanding shares? (item no. 32) Does the IDX/FSA have any evidence of non-compliance of the company with IDX/FSA rules and regulations over the last two years? Or (item no. 50) Does the corporate secretary attend all board of directors meetings? These example items depict how the quality of governance practices can vary over time. The complete list is available in Appendix.

In summary, opting for CGI over individual items offers several advantages. Firstly, it addresses the quality of corporate governance within a firm. Individual governance factors often fail to reflect this quality adequately due to their data measurement nature (nominal). Secondly, some governance variables lack variance, leading to issues of concomitant variation. For example, certain companies maintain consistent board structures throughout the sample period, posing analytical challenges (Bhagat *et al*., 2008). CGI operates on the principle of benchmarking a firm's governance attributes against what the index constructor deems best practices. Consequently, a firm's score on the index or rating aims to offer a readily comparable, summarized measure of governance quality.

3. Literature review

3.1 Theoretical arguments

The theoretical and empirical arguments on corporate governance literature are predominantly based on agency theory (Fama and Jensen, 1983; Jensen and Meckling, 1976). This theory is used to better understand how effective governance controls and monitors agents' actions, aligning them with the principal interests to enhance company performance (Fama and Jensen, 1983). The foundation of this relationship lies in the principle that thorough supervision ensures that the firm operates in the shareholders' best interests, and as the consequences, the performance increases.

In the agency framework, conflicts of interest often arise because principals face significant information asymmetry (Renders *et al*., 2010; Zattoni *et al*., 2020). It is the result from agent's insider knowledge to serve personal interests, like securing job stability or maximizing compensation (Olaniyi, 2019). Hence, the agents may delay or obscure the disclosure of financial distress to maintain their positions and benefits (Agyei-Mensah, 2018). Furthermore, Hernández-Lagos *et al*. (2017) posit that the risk-taking behavior of the agents due to this information asymmetry reduce the firm performance. These actions also can lead to the likelihood of financial distress or bankruptcy (Li *et al*., 2008).

This theoretical concept aligns with the zombification of firms, where weak governance increases agency problems. For instance, information asymmetry between principals and managers hinders transparent communication, preventing principals from effectively intervening in managerial inefficiencies and adding to agency costs (Tut, 2023; Ghouma *et al*., 2018). The lack of transparency allows underperforming managers to conceal critical issues, perpetuating inefficiencies and misallocating resources. This concealment further strains the firm's financial health, as creditors and suppliers may unknowingly extend credit or approve refinancing, assuming the firm's viability (Bhattacharya *et al.*, 2013; Pappas *et al.*, 2019; Kim *et al.*, 2021). Such governance failures increase the firm's cost of capital by masking inherent risks, entrenching debt cycles, and intensifying the likelihood of zombification (San-Jose *et al.*, 2022).

Using the agency theory framework, we investigate if the overall quality of control and monitoring, assessed by CGI, influences the severity of the issue of zombiness. The tenet is that weak governance practices may contribute to mismanagement, inefficient resource allocation, and inadequate strategic planning, worsening the problem of zombiness.

3.2 Hypothesis development

The discussion around zombie firms originated from studies examining Japan's economic stagnation in the late 20th century, notably by Caballero *et al.* (2008). These studies highlighted a critical issue during this period: the misallocation of financial resources, which prolonged the survival of unproductive firms and delayed their exit from the market. The literature then flourished by emphasizing the importance of government incentives to stop the increase in the share of zombie firms in an industry. Zombieness can spread to healthy companies through reduced aggregate productivity and increased productivity gap between zombies and non-zombies (Caballero *et al.*, 2008). This spillover effect has been observed globally, including in China (Tan *et al.*, 2016), OECD countries (McGowan *et al.*, 2017), and European markets (Andrews and Petroulakis, 2019).

Building on these foundational insights, subsequent studies focused on firm-level observations, uncovering key characteristics of zombieness, such as high leverage, low return on assets (ROA), and firm age (refer to Table 3). Research has also explored broader influences, including the role of market competition in intensifying zombification (Zhang and Huang, 2022). More recently, governance attributes have entered the discussion, with Fang *et al.* (2020) investigating how factors like gender diversity within corporate boards may influence the persistence of zombie firms. These studies reflect a growing interest in understanding zombie companies' internal and external drivers.

Extending this line of inquiry, corporate governance has emerged as a crucial determinant of zombie companies, particularly in managing information asymmetry within the agency framework. By far, only San-Jose *et al.* (2022) explore this stream by proposing four attributes of corporate governance as the factors to reduce the likelihood of zombies. The argument is that the agents, driven by personal incentives such as job security or compensation, may obscure or delay the disclosure of financial distress, thereby compounding inefficiencies and resource misallocation (Agyei-Mensah, 2018; Olaniyi, 2019). This lack of transparency undermines principals' ability to address managerial shortcomings and misleads creditors and suppliers into extending financial support to unsustainable firms (Bhattacharya *et al.*, 2013; Pappas *et al.*, 2019). These governance lapses intensify debt cycles and reduce firm productivity, entrenching zombieness (San-Jose *et al.*, 2022).

This is backed by the corporate governance literature, which has extensively examined the impact of the corporate governance index on firm performance. Seminal works from Gompers *et al.* (2003), Bebchuk *et al.* (2009), and Drobetz *et al.* (2004) have shown that these indexes offer a comprehensive measure of governance quality, linking it to firm performance. Connelly *et al.* (2012) and Siddiqui (2015) argue that the index captures the collective effect of multiple governance practices and makes comparing companies' overall governance easier.

Intriguingly, the literature is massive but limited in its effect on profitability. For example, MacAulay *et al.* (2009) utilized CGI as a gauge of governance practices in Canada. They identified the positive association between firm performance and CGI. They attributed this positive relationship to the increasing commitment to governance guidelines from 2003 to 2007, despite a weakening compliance trend from 2005 to 2007. The performance of Canadian firms mirrored the fluctuation of CGI scores during this period.

In recent years, Bauer *et al.* (2008) investigated the connection between CGI and firm performance in developed nations. Their findings revealed that well-governed firms consistently outperform poorly governed ones by as much as 15% annually. Akbar *et al.* (2016) used 435 UK non-financial publicly listed firms from 1999 to 2009. Their findings show that CGI does not affect corporate performance in the UK. This differs from the findings of Clacher *et al.* (2008) and Renders *et al.* (2010), who also used the UK as the research setting but found a positive association. One argument from Akbar *et al.* (2016) for the discrepancy is the endogeneity issue, which was not tackled by Clacher *et al.* (2008) and Renders *et al.* (2010).

In the context of developing economies, Arora and Bodhanwala (2018) affirm a positive relationship between CGI and firm performance in India. Black *et al.* (2006) found a significant positive association between CGI and the market value of Korean-listed companies. Wahab *et al.* (2007) studied 440 Malaysian listed companies and concluded that higher CGI leads to better performance. In the Indonesian context, Siagian *et al.* (2013) tested this hypothesis on 125 listed companies and confirmed the positive relationship. Nevertheless, this body of knowledge only emphasizes how corporate governance quality affects firm performance, not zombies.

Therefore, to the extent that CGI can increase firm performance or decrease financial distress, we expect a negative relationship between CGI and Zombie due to control and monitoring. It indicates that companies with weak corporate governance practices would be more likely to be Zombie, affirming the agency theory. We thus hypothesize:

H1. A higher quality of governance practices, which is measured by the corporate governance index, would lead to a lower probability of Zombie Companies.

It is noteworthy that the existing governance-zombie literature primarily focuses on individual governance attributes, overlooking the interactive, complementary effects within a corporate governance system. For instance, San-Jose *et al.* (2022) use only four attributes and found that board structure significantly affects the zombification of Spanish firms, while Veganzones and Severin (2023) reported that managerial ownership and ownership concentration can prolong a firm's zombified state of French companies. Unlike our study, these two studies do not address the endogeneity and effect of political connection and family ownership. Moreover, our research takes a unique approach by examining the individual effects of each dimension within the corporate governance index on the likelihood of zombification. This analysis aims to identify which specific governance dimensions play a significant role in contributing to or mitigating the persistence of zombie firms. Our argument is that each dimension of the CGI plays different role on reducing information asymmetry, a key factor in causing zombification.

For instance, the Rights of Shareholders dimension enhances accountability through timely disclosures, such as director appointments and remuneration, empowering shareholders to monitor management effectively. The Equitable Treatment of Shareholders dimension curbs insider advantages by regulating related-party transactions and insider trading, promoting fairness and resource efficiency. The Role of Stakeholders dimension promotes accountability to broader interests, encouraging transparency and deterring actions that compromise long-term sustainability. The Disclosure and Transparency dimension ensures the accurate, timely dissemination of critical information, limiting managers' ability to obscure distress. Finally, the Responsibility of the Board dimension strengthens control through active, independent boards and committees, aligning managerial actions with strategic goals and mitigating inefficiencies.

4. Methodology

4.1 Data

Our sampling frame consists of all listed Indonesian firms from 2014 to 2022. We acquired the data from the Bursa Indonesia (Indonesian Stock Exchange/IDX) Website, extracting information exclusively from the annual reports of selected companies within that timeframe. We specifically included firms listed during this period and excluded financial and utility companies due to their governance being governed by distinct regulatory and supervisory frameworks. To counteract the impact of outliers, all continuous variables, excluding dummy variables, were subjected to winsorization at the 1st and 99th percentiles. The final sample consists of 3,051 firm-year observations of Indonesian listed firms over 9 years and 339 firms.

Table 1 displays the summary statistics of the data. We start by describing the zombie measure, where the average value is 0.22. It is slightly below the reported average of 0.25 for Chinese firms by Ren *et al.* (2023) during the 1998–2013 period. In contrast, the average for the Italian context in 2018 was only 0.12 (Schivardi *et al.*, 2020), indicating a notable difference. However, with a mean value of 0.22, there appears to be a significant presence of zombie companies among Indonesian publicly listed firms, which is in line with an estimate by the Center of Economic and Law Studies, which suggests around 20%. For the main effect of CGI, the mean value is 68.41%, which is higher than that of Siagian *et al.* (2013), who reported a value of 67% for 125 Indonesian-listed firms. Meanwhile, Black *et al.* (2017) reported a value of 61% for 254 Brazilian listed firms.

In terms of zombie statistics, Table 2 reveals that the total of zombie companies slightly increased from time to time, with a significant number in 2021 (33%). It also shows that the CGI mean score is relatively low, with a value of 63.68, which is lower than the overall mean value of 68.14. We further ran Welch's *t*-test for unequal groups to test whether the CGI score of zombie companies is different from the non-zombie. The results show a t-value of 7.38, implying there is a significant difference in CGI between zombie and non-zombie.

Table 1. Summary statistics

Variables	Mean	25th	Median	75th	Std. dev
Dependent variable					
ZOMBIE (DUMMY)	0.22	0	0	1	0.42
Main independent variable					
CGI (%)	68.41	31	69	85	17.17
Corporate governance index dimension					
RIGHT OF SHAREHOLDERS (%)	58.80	27	59	83	12.32
EQUITABLE TREATMENT OF SHAREHOLDERS/EQ (%)	67.40	31	68	84	14.80
ROLE OF STAKEHOLDERS/STAKE (%)	57.10	26	58	81	11.92
DISCLOSURE AND TRANSPARENCY/DISCLOSE (%)	79.88	36	81	89	24.26
RESPONSIBILITY OF THE BOARD/RESPONSIBILITY (%)	78.82	36	79	88	22.54
Control variables					
SIZE (LN)	18.84	12.86	18.82	20.06	2.09
LEVERAGE (%)	43.84	29.93	43	56.36	17.94
AGE (LN)	3.06	2.64	3.17	3.61	0.73
ROA (%)	3.06	−0.4	3.18	6.97	24.03
GROWTH (%)	8.01	−5.47	3.56	18.58	36.02
Total Firms (*n*)	339				
Total Years (t)	9				
Total Observation (*N*)	3,051				
Multicollinearity (VIF)	1.08				

Source(s): Table created by authors

Table 2. Summary of zombie companies

	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Zombie	46	56	76	78	70	72	84	112	87
% of Zombie	14%	17%	22%	23%	21%	21%	25%	33%	26%
Zombie's CGI	55.37	61.25	65.38	66.42	68.11	66.03	66.14	49.97	69.35

Source(s): Table created by authors

4.2 Estimation model

Our identification strategy builds on established literature (summarized in Table 3), which consistently identifies leverage, size, age, and return on assets (ROA) as primary predictors of zombie companies. We incorporate these as control variables in our baseline model, alongside CGI as the main independent variable. Although prior studies also included growth, cash holdings (Cashhold), and the current ratio, our preliminary multicollinearity analysis indicated high correlations among Cashhold, current ratio, and fixed assets turnover. To confirm this, we conducted Principal Component Analysis (PCA), where low eigenvalues for these variables suggested minimal contribution to model variance, leading to their exclusion. The correlation and PCA results are available as supplementary files for review upon request.

To empirically estimate this model, we aggregate all sample firms and proceed to estimate the regression model as follows.

$$ZOMBIE_{i,t} = \beta_1 + \beta_2 CGI_{i,t} + \beta_3 LAGE_{i,t} + \beta_4 GROWTH_{i,t} + \beta_5 LEV_{i,t} + \beta_6 ROA_{i,t} + \beta_7 SIZE_{i,t} + \sum_{j=1}^{J-1} \beta_{8j} IND_j + \sum_{t=1}^{T-1} \beta_{9t} YR_t + \epsilon_{i,t} \quad (1)$$

Note that $ZOMBIE_{i,t}$ denotes the zombification of company *i* at year *t*; CGI is the corporate governance index, LAGE is lognormal of the age of the company at year *t*; GROWTH is the annual revenue growth of the company; LEV is the leverage of the company; ROA is the profitability of the company; SIZE measures the size of the company using lognormal of total asset. The full details of the variable definition are in the next section.

In our panel regression model, we include industry (IND) and year (YR) fixed effects to control for unobserved heterogeneity across industries and time. Industry-specific dummy variables (INDj) are constructed based on the Indonesian Stock Exchange sector classifications, where INDj = 1 if firm i belongs to industry j and 0 otherwise, with J representing the number of industries. These industry dummies account for time-invariant

Table 3. Literature summary for baseline

Authors	Firm characteristics as control variables
Carreira *et al.* (2022)	Leverage, Size, Age, ROA
Fang *et al.* (2020)	Leverage, Size, Operating Income, Financing Cost, Net Profit
Zhang and Huang (2022)	Leverage, Size, Age, ROA, Current Ratio
Blažková and Dvouletý (2020)	Leverage, Size, ROS
Dai *et al.* (2019)	Leverage, Size, Age, ROA
Han *et al.* (2019)	Leverage, Size, Age, ROA
Urionabarrenetxea *et al.* (2018)	Leverage, Size
Jiang *et al.* (2017)	Leverage, Size, ROA, Growth, Cash

Source(s): Table created by authors

characteristics unique to each industry. To control for period-specific effects, we include year dummies (YRt), where YRt = 1 if firm i is in year *t* and 0 otherwise, with *T* representing the number of years. This approach allows our model to capture industry, time, and firm-specific variations in a more comprehensive manner.

Our data is structured in a panel format, incorporating time series and cross-sectional dimensions. We pooled the data and conducted diagnostic tests such as the Chow test, Breusch-Pagan LM test, and Hausman test to assess the suitability of individual effects for selecting our panel regression approach. Additionally, we assessed all assumptions of linear regression models to ensure the model's robustness. Since our dependent variable (Zombie) is binary, we prioritize a panel logistic regression approach. We chose the logit model because it effectively handles binary outcomes, specifically when analyzing zombie companies. This model provides intuitive interpretations of coefficients as odds ratios, making it easier to communicate results. By employing a panel logit model, we can incorporate both cross-sectional and time-series data, allowing for a more comprehensive understanding of the factors influencing the presence of zombie companies. In the following section, each measure will be detailed.

4.3 Measures

4.3.1 Zombie companies. The zombie measure is adopted from the seminal work of the Caballero *et al*. (2008) (CHK) model. The fundamental idea behind the CHK model is rooted in the observation that when a company pays interest on its debts below the market-calculated minimum interest rate, it may have obtained credit concessions from other institutions. These concessions allow the company to continue operating despite its financial instability, effectively making it reliant on non-market credit sources. Consequently, these companies are in a precarious financial state, where a significant portion of their cash flow is dedicated solely to servicing interest payments. This leaves little room for investment in growth initiatives or creating a sustainable business model, hindering their ability to establish long-term viability.

The CHK model requires various financial data from firms, including long-term debt (BL), short-term debt (BS), current assets (CA), accounts receivable (AR), inventory (INV), total debt (DEBT), interest expense (RC), 1-year benchmark loan interest rate (Indonesia 12-Month average Jakarta Interbank Offering Rate/JIBOR; rs), 5-year long-term benchmark loan interest rate (Indonesia 5-year average Sukuk Rate; rl), and 1-year benchmark deposit interest rate (Indonesia 12 Month average T-bills; rd). Then, we can calculate the required minimum interest rate to be paid (RA) and corporate interest income (RB) as follows.

$$RA_{i,t} = [rs_{t-1}xBS_{i,t-1}] + \left[\left(\sum_{j=1}^{5} rl_{t-j}/5\right)xBL_{i,t}\right] \text{ and}$$

$$RB_{i,t} = [(CA_{i,t-1} - AR_{i,t-1} - INV_{i,t-1})x\, rd_t]$$

The next procedure is to calculate the CHK GAP using the following formula:

$$CHK\ GAP_{i,t} = \frac{[RC_{i,t} - (RA_{i,t} - RB_{i,t})]}{DEBT_{i,t-1}}$$

According to Caballero *et al*. (2008), a CHK GAP below 1 means the company is a Zombie. Hence, it is labeled with a score of "1", while others are given a "0". Thus, Zombie is a binary variable, where "1" represents zombie companies, whereas "0" signifies non-zombie entities.

4.3.2 Corporate governance index (CGI). Following the literature, we use the corporate governance index (CGI) as the proxy for the quality of governance practices. To align our assessment with the Indonesian governance context, we adopted scoring criteria from Siagian *et al*. (2013). We adopt Siagian *et al*.'s (2013) methodology to develop the CGI for three main reasons. Firstly, it covers all dimensions of corporate governance, aligning with OECD principles: rights of shareholders, equal treatment of shareholders, the role of stakeholders, disclosure and transparency, and board responsibilities. Secondly, it is tailored to the Indonesian context, having been endorsed by the Indonesian Accounting Institute. Thirdly, it has been widely utilized in existing literature (e.g. Tanjung, 2020; Purbawangsa *et al*., 2020). Each governance attribute present in a firm is checked, matched, and assigned a score of "1." The scoring formula is as follows:

$$CGI_{i,t} = \frac{Governance\ Items}{Total\ Items}$$

We conduct reliability tests using Cronbach's Alpha to confirm that the items consistently measure the CGI instrument concept. The alpha score obtained is 0.82, exceeding the 0.6 threshold recommended by Nunally and Bernstein (1994). The alpha score of 0.82 is comparatively higher than the alphas reported in the study by Black *et al*. (2017), which recorded values of 0.80 and 0.76 for the Brazilian and Korean contexts, respectively. Despite this difference, we confirm the reliability of the items.

4.3.3 Control variables. The empirical finance literature has offered control variables of zombie companies to isolate the independent effect of CGI. Our list of control variables includes firm age (LAGE), representing the logarithm of the firm's establishment year; firm growth (GROWTH), indicating the percentage of yearly revenue growth; leverage ratio (LEV), representing the firm's debt ratio; profitability (ROA), denoting the ratio of net income to total assets; and firm size (SIZE), denoting the logarithm of total assets. Further details defining the variable dimensions can be found in Table 4.

5. Results

5.1 Correlation analysis

Table 5 presents the correlation matrix for the variables in our estimation model (1). This matrix indicates the univariate relationship between the explanatory variables and the Zombie variable, providing an initial insight into their relationship. The correlation coefficients are noteworthy. Only ROA has a coefficient above 0.1, while the coefficients for the other control

Table 4. Variable definition

Variable	Notation	Definition	Source
Zombie Companies	Zombie	CHK GAP lower than 1 = zombie companies, otherwise = "0"	Caballero *et al*. (2008)
		"1" if Interest rate coverage is lower than 1 in three consecutive years, otherwise "0"	Jiang *et al*. (2017)
Corporate Governance Index	CGI	Index of 52 corporate governance items	Siagian *et al*. (2013)
Firm Age	Age	Lognormal of the total establishment year	Brahmana *et al*. (2022)
Firm Growth	Growth	Annual growth of revenue	Jiang *et al*. (2017)
Leverage	Leverage	Total debt to total assets	Brahmana *et al*. (2022)
Profitability	ROA	Total net income to total assets	Brahmana *et al*. (2022)
Firm Size	SIZE	Lognormal of total assets	Brahmana *et al*. (2022)

Source(s): Table created by authors

Table 5. Correlation matrix

	Zombie	CGI	SIZE	LEVERAGE	AGE	ROA
ZOMBIE (DUMMY)	1					
CGI (%)	−0.13	1				
SIZE (LN)	−0.09	0.02	1			
LEVERAGE (%)	−0.04	0.04	0.18	1		
AGE (LN)	0.06	0.01	0.38	0.04	1	
ROA (%)	−0.17	0.02	0.06	−0.06	0.02	1
GROWTH (%)	−0.06	0.02	0.03	−0.02	−0.05	0.06

Source(s): Table created by authors

variables are relatively low. As anticipated, the signs align with expectations, except for leverage. Smaller, older, less profitable, and slower-growing firms are more likely to be associated with a higher probability of being a Zombie. Turning to the main effect of CGI, it shows the negative coefficient with Zombie. Additionally, we conducted a collinearity check using the Variance Inflation Factor (VIF). The results indicate a mean VIF value of 1.08, diminishing concerns about collinearity affecting our regression analysis.

5.2 Regression results

Table 6 presents the findings from hypothesis testing conducted through logit-based regression methods. In this table, Column (1) serves as the baseline, while Columns (2) and (3) showcase our primary outcomes. Column (2) displays the outcomes derived from pooled logit regression, while Column (3) exhibits the results of robust panel logit regression. It is noteworthy that we

Table 6. Regression results

	Logit [1]	Logit [2]	Panel logit [3]
CGI		−0.019***	−0.019***
		(0.003)	(0.004)
ROA	−0.028***	−0.028***	−0.039***
	(0.006)	(0.006)	(0.007)
GROWTH	−0.0023*	−0.002	−0.003
	(0.0012)	(0.001)	(0.002)
LEVERAGE	−0.003	−0.003	0.003
	(0.003)	(0.003)	(0.004)
SIZE	−0.117***	−0.118***	−0.134**
	(0.025)	(0.025)	(0.063)
AGE	0.387***	0.394***	0.706**
	(0.073)	(0.072)	(0.275)
Year Effect	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes
Pseudo R^2	0.06	0.09	0.09
N	3,051	3,051	3,051

Note(s): The dependent variable employs "Zombie" with the CHK (2017) model. CGI denotes corporate governance index; ROA denotes Returns on Assets; GROWTH denotes the turnover growth; LEVERAGE denotes the debt ratio; SIZE denotes the firm's size; and AGE denotes the lognormal of the firm's age. Column [1] provides baseline results under logit regression, while Columns [2] and [3] present the main outcomes, estimated with pooled logit and robust panel logit regression, respectively. Figures are the coefficient values except those in the parenthesis, which are robust standard errors values. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively
Source(s): Table created by authors

analyze our findings based on the robust panel logit regression, as it is the most appropriate and rigorous method for our analysis, ensuring brevity without sacrificing rigor.

The results confirm our hypothesis, indicating a negative relationship between CGI and Zombie ($\beta = -0.019$, SE $= 0.004$). This implies that as firms enforce stronger corporate governance, their likelihood of becoming Zombies decreases. In practical terms, the coefficient suggests a 1.9% probability difference in CGI between Zombie and non-zombie firms, with non-zombie firms exhibiting higher CGI levels than Zombies. Although a 1.9% improvement in corporate governance practices may appear modest, it significantly reduces a firm's likelihood of becoming a Zombie.

Our findings align with existing literature on emerging economies, which highlights the positive influence of corporate governance on improving firm distress. For example, Li *et al.* (2008) found similar effects in Chinese firms, while Lee and Yeh (2004) reported comparable results in Taiwanese firms. This suggests that improving corporate governance practices can be an effective strategy across various emerging markets to help firms avoid financial challenges.

5.3 Robustness check 1: alternative Zombie measurement

In contrast to the commonly used CHK model for identifying zombie companies, several empirical studies have opted for an alternative approach known as the time interest earnings (TIE) method (Banerjee and Hofmann, 2022). This approach interprets a TIE ratio below 1 as a sign of financial distress, while dropping below 0 indicates negative earnings insufficient to cover interest payments. Such a scenario characterizes zombie firms that rely on constant refinancing or external funding to survive. Jiang *et al.* (2017) have further refined this measure, suggesting that persistent low TIE levels over consecutive years (t-1 and t) offer a clearer indication of chronic financial challenges. This recurring pattern highlights the ongoing struggle of these firms to generate adequate profits to service their debts.

Hence, we conducted additional tests using the TIE model, presented in Table 7. The results highlight a significant relationship between CGI and Zombie. Specifically, CGI exhibits a negative correlation with Zombie ($\beta = -0.035$, SE $= 0.004$), suggesting that stronger corporate governance reduces the likelihood of a firm becoming a Zombie. Furthermore, these findings uphold our hypothesis across various Zombie measurements, reinforcing the validity of our hypothesis testing results.

5.4 Robustness check 2: endogeneity

We also conduct robustness checks to address endogeneity concerns, with the results presented in Table 8. First, we re-estimate the regression model by utilizing one-year lagged explanatory variables instead of their contemporaneous values, as Bellemare *et al.* (2017) suggested. The results in Columns (1) and (2) of Table 8 present the results, showing that our primary finding regarding the negative correlation between CGI and zombies remains consistent.

Second, we follow Roberts and Whited (2013) and Geng *et al.* (2021) by conducting 2SLS because it can mitigate endogeneity issues arising from potential reverse causality or excluded variables. However, a critical consideration in 2SLS is the selection of instrumental variables (Roberts and Whited, 2013). Therefore, we follow Chen *et al.*'s (2019) recommendation by choosing CEO tenure and Larcker and Rusticus (2010) for the presence of BIG-4 audit firms as instrumental variables within the corporate governance framework. Note that we also run the post-estimation of the **Wald Test** and **Sargan test** to ensure the rigor of the 2SLS without any overidentification problem. The results in Columns (3) and (4) remain intact, affirming the negative relationship between CGI and zombies. This suggests that enhanced corporate governance measures can help steer firms away from the risk of becoming zombies.

Table 7. Alternative Zombie measurement

	Logit [1]	Logit [2]	Panel logit [3]
CGI		−0.036***	−0.035***
		(0.004)	(0.004)
ROA	−0.012***	−0.012***	−0.018***
	(0.003)	(0.003)	(0.005)
GROWTH	0.001	0.001	0.003
	(0.002)	(0.002)	(0.002)
LEVERAGE	0.001	0.002	−0.001
	(0.003)	(0.003)	(0.005)
SIZE	−0.062*	−0.062*	−0.052*
	(0.032)	(0.032)	(0.029)
AGE	0.337***	0.361***	2.530***
	(0.090)	(0.088)	(0.412)
Year Effect	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes
Pseudo R^2	0.04	0.09	0.13
N	3,024	3,024	3,024

Note(s): The dependent variable employs the "Zombie" of Jiang *et al.* (2017). CGI denotes corporate governance index; ROA denotes Returns on Assets; GROWTH denotes the turnover growth; LEVERAGE denotes the debt ratio; SIZE denotes the firm's size; and AGE denotes the lognormal of the firm's age. Column [1] provides baseline results under logit regression, while Columns [2] and [3] present the main outcomes, estimated with pooled logit and robust panel logit regression, respectively. Figures are the coefficient values except those in the parenthesis, which are robust standard errors values. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively
Source(s): Table created by authors

Table 8. Endogeneity results

	One-lagged CHK [1]	TIE [2]	TSLS CHK [3]	TIE [4]
CGI	−0.005*	0.011***	−0.012***	−0.009***
	(0.003)	(0.004)	(0.001)	(0.001)
ROA	−0.011***	−0.015***	−0.003***	−0.001***
	(0.004)	(0.005)	(0.000)	(0.000)
GROWTH	−0.002	−0.0002	−0.0003*	−0.0002
	(0.002)	(0.002)	(0.0002)	(0.0002)
SIZE	0.003	0.003	0.001	−0.012
	(0.004)	(0.005)	(0.009)	(0.008)
LEVERAGE	0.298***	0.176*	0.001**	0.0002
	(0.085)	(0.102)	(0.001)	(0.000)
AGE	0.624**	1.612***	0.127***	0.211***
	(0.278)	(0.364)	(0.029)	(0.024)
N	2,712	2,712	3,051	3,051

Note(s): Columns [1] and [2] present results using one-year lagged explanatory variables following Bellemare *et al.* (2017), with the CHK model as the dependent variable in Column [1] and the Jiang *et al.* (2017) model in Column [2]. Columns [3] and [4] display Two-Stage Least Squares results, with the CHK model as the dependent variable in Column [3] and the Jiang *et al.* (2017) model in Column [4]. CGI denotes corporate governance index; ROA denotes Returns on Assets; GROWTH denotes the turnover growth; LEVERAGE denotes the debt ratio; SIZE denotes the firm's size; and AGE denotes the lognormal of the firm's age. Figures are the coefficient values except those in the parenthesis, which are robust standard errors values. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively
Source(s): Table created by authors

5.5 Robustness check 3: by dimensions

We extended our research by examining the dimensional effects of the Corporate Governance Index (CGI) to gain deeper insights into its components. Table 9 provides evidence supporting our earlier findings, demonstrating that the dimensions "Right of Shareholders" (RS), "Equitable Treatment of Shareholders" (EQ), and "Responsibility of the Board" negatively influence the likelihood of firms becoming Zombie companies. While the effect of RS is modest and statistically significant at the 10% level, EQ and Responsibility are more impactful, with significance at least at the 5% level.

Therefore, governance attributes from RS, such as ensuring transparency in board remuneration, the requirement for shareholder approval of board remuneration, and preventing board members from holding excessive shares, along with EQ features like preventing insider trading, providing the rationale for related-party transactions, and ensuring timely notice of shareholder meetings, are critical features to avoid zombification. Further, attributes from Responsibility, such as establishing clear corporate governance rules, evaluating individual board performance, and promoting the independence of audit committees, are also considered crucial features for firms to reduce the likelihood of zombieness.

Conversely, the dimensions of "Role of Shareholders" (Stake) and "Disclosure and Transparency" show no significant effects on Zombie probability. This finding suggests that governance attributes, such as shareholder involvement in critical decisions, frequency of shareholder meetings, and board independence (Stake), as well as the quality of corporate

Table 9. Corporate governance dimensional effect results

	Panel LSDV [1]	Logit [2]	Panel logit [3]
RS	−0.040*	−0.286*	−0.372*
	(0.022)	(0.161)	(0.213)
EQ	−0.130**	−1.124***	−1.044**
	(0.052)	(0.276)	(0.444)
STAKE	0.014	0.316*	0.143
	(0.025)	(0.171)	(0.228)
DISCLOSURE	−0.036	−0.156	−0.304
	(0.023)	(0.149)	(0.211)
RESPONSIBILITY	−0.061**	−0.483***	−0.475**
	(0.024)	(0.149)	(0.212)
ROA	−0.003***	−0.027***	−0.037***
	(0.001)	(0.006)	(0.007)
GROWTH	−0.000**	−0.002	−0.003*
	0.000	(0.001)	(0.002)
LEVERAGE	0.001	−0.004	0.004
	(0.001)	(0.003)	(0.004)
SIZE	−0.026***	−0.106***	−0.063***
	(0.010)	(0.018)	(0.023)
AGE	0.032	0.376***	0.446*
	(0.031)	(0.071)	(0.268)
Year Effect	Yes	Yes	Yes
Industry Effect	Yes	Yes	Yes
N	3,051	3,051	3,051

Note(s): This table presents the dimensional results, estimating the effects of each corporate governance index. RS denotes "Right of Shareholders," EQ denotes "Equitable treatment of shareholders," STAKE denotes "Role of Shareholders," Disclosure denotes "Disclosure and Transparency," and Responsibility denotes "Responsibility of the board". Refer to Appendix for the full items. Figures in the parenthesis are robust standard errors values. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. For brevity, we do not show all variables

Source(s): Table created by authors

disclosures, audit committee reports, and the basis for selecting auditors (Disclosure), appear empirically trivial in this regard.

The lack of significant effect from these attributes arises because they do not directly tackle the financial health or operational inefficiencies that contribute to zombification. These items primarily focus on governance structure and communication rather than addressing the firm's capacity to make sound financial decisions, manage debt, or improve operational performance. Consequently, these attributes may not be impactful enough to prevent zombification.

5.6 Robustness check 4: by sectors

Our sample consists of non-financial firms across 11 different sectors. Therefore, the significant results from our earlier estimations may reflect varying relationships across industries that offset each other. To explore this possibility, we re-estimate the model for each industry in our sample, excluding those sectors with fewer than 6 firms. This led us to drop the services and healthcare sectors.

The results within each industry in Table 10 reveal a consistent negative relationship between CGI and Zombie across most sectors, except Infrastructure, Properties and Real Estate, and Technology. This aligns with Wangsa *et al.* (2023) and Ray and Ing (2016)'s suggestion that these sectors benefit from government incentives. Overall, our conclusion remains unchanged: CGI has a negative impact on a firm's probability of becoming a Zombie.

5.7 Post-hoc analysis 1: effect of political connection

As aforementioned, Zombie firms persist in a "floating" state by relying heavily on bank loans and government subsidies to avoid bankruptcy (Caballero *et al.*, 2008; Fukuda and Nakamura, 2011; Kane, 1987). A key factor contributing to their zombification may be their political connections, which can provide preferential access to financial support and regulatory leniency. This inquiry aligns with existing literature, such as Leuz and Oberholzer-Gee (2006) and Joni *et al.* (2020), which suggests that politically connected firms in Indonesia receive government support in the form of lower capital costs. Therefore, we conduct a post-hoc analysis to investigate whether political connections moderate the relationship between weak governance practices (low CGI) and zombification, potentially serving as a channel that enables poorly governed firms to avoid default and stay as zombies.

Our variable interest in this post-hoc is the political connection, which refers to firms having interactions or affiliations with politicians through board memberships or significant

Table 10. The CGI effects by Sectors

Consumer non-cyclical		Consumer cyclicals		Basic materials	
CHK	TIE	CHK	TIE	CHK	TIE
−0.033***	−0.032***	−0.021***	−0.025***	−0.080***	−0.133***
(0.008)	(0.011)	(0.007)	(0.007)	(0.026)	(0.044)
Transportation and Logistic		Industries		Infrastructure	
CHK	TIE	CHK	TIE	CHK	TIE
−0.025*	−0.069**	−0.073**	−0.295**	0.001	−0.015
(0.013)	(0.030)	(0.029)	(0.137)	(0.009)	(0.010)
Properties and Real Estate		Technology		Energy	
CHK	TIE	CHK	TIE	CHK	TIE
0.007	−0.014	0.057	−0.057	−0.086***	−0.066***
(0.012)	(0.013)	(0.053)	(0.103)	(0.017)	(0.018)

Note(s): This table presents sub-sample results, categorizing each company by industry to examine whether the effect of CGI on Zombie differs across industries. The model is estimated using robust panel logit regression. Figures in the parenthesis are robust standard errors values. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively. For brevity, we do not show all variables
Source(s): Table created by authors

ownership stakes (Joni *et al.*, 2020). If the firms fill in the criteria, we score "1". Otherwise, it is "0".

Our methodology involves re-estimating the model using the following steps: Firstly, we conduct sub-sampling by categorizing the samples into political connection, non-political connection, and full sample groups. Next, we estimate the political and non-political connection groups using our Model (1). Meanwhile, for the full sample, we adopt the approach outlined by Brambor *et al.* (2006), employing an interaction model between political connection and CGI. This interaction model examines how political connection moderates the relationship between CGI and Zombie firms. The results are presented in Table 11, which includes the outcomes using both Zombie measures (CHK and TIE). Columns (1) and (2) display the results for the political connection sample, while Columns (3) and (4) present the findings for the non-political connection group. Finally, Columns (5) and (6) showcase the results of the interaction model.

The results show a consistent negative relationship between CGI and Zombie status across all groups and measurement methods. This aligns with our previous findings, indicating that higher CGI decreases the likelihood of a firm being classified as a Zombie. Furthermore, the non-significance of the interaction terms between political connection and CGI suggests no apparent difference in how CGI influences Zombie status between politically connected and non-politically connected firms. Therefore, CGI remains a critical factor in reducing the likelihood of a firm becoming a Zombie, regardless of its political affiliations.

Table 11. Political connection effects

	Polcon firms		Non-Polcon firms		Interaction (Polcon*CGI) (all samples)	
	CHK [1]	TIE [2]	CHK [3]	TIE [4]	CHK [5]	TIE [6]
POLCON					1.913***	2.197**
					(0.716)	(0.889)
POLCON*CGI					−0.003	−0.012
					(0.008)	(0.010)
CGI	−0.024***	−0.048***	−0.017***	−0.029***	−0.019***	−0.032***
	(0.005)	(0.008)	(0.003)	(0.004)	(0.004)	(0.005)
ROA	−0.031***	−0.033***	−0.027***	−0.008***	−0.039***	−0.018***
	(0.010)	(0.010)	(0.007)	(0.003)	(0.007)	(0.005)
GROWTH	−0.002	0.003	−0.002	0.000	−0.003*	0.003
	(0.003)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)
LEVERAGE	0.006	0.003	−0.008**	0.000	0.003	−0.001
	(0.005)	(0.007)	(0.003)	(0.004)	(0.004)	(0.005)
SIZE	−0.225***	−0.064	−0.091***	−0.063*	0.051	0.052
	(0.055)	(0.073)	(0.028)	(0.034)	(0.085)	(0.106)
AGE	0.337**	0.354*	0.413***	0.299***	0.561**	2.385***
	(0.153)	(0.187)	(0.081)	(0.094)	(0.275)	(0.409)
Pseudo R^2	0.05	0.086	0.13	0.067	0.093	0.135
N	850	850	2,201	2,201	3,051	3,051

Note(s): CHK and TIE are two different measures of Zombie used as the dependent variable. Columns (1) and (2) display results for the political connection sample, Columns (3) and (4) show findings for the non-political connection group, and Columns (5) and (6) present the interaction model results. CGI denotes corporate governance index; ROA denotes Returns on Assets; GROWTH denotes the turnover growth; LEVERAGE denotes the debt ratio; SIZE denotes the firm's size; and AGE denotes the lognormal of the firm's age. Figures are the coefficient values except those in the parenthesis, which are robust standard errors values. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively
Source(s): Table created by authors

5.8 Post-hoc analysis 2: effect of family firms

We add another post-hoc analysis, which is the effect of family firms. Because our sample is a developing economy, family ownership may play an important role in the zombification. The theoretical argument is that family firms have agency alignment due to family succession; hence, family-owned firms usually have lower agency costs and higher monitoring (Perwitasari *et al.*, 2022; Dinh and Calabrò, 2019; Chen and Nowland, 2010). With this logic, the CGI of family firms should be significantly different from non-family firms. Yet, our *t*-test shows something different, with no significant difference. Therefore, we further examine the moderating role of family firms on the relationship between CGI and Zombie.

Following the same approach used in our post-hoc analysis of political connections, we conducted a similar analysis to examine the effects of family firms on zombification. Initially, we defined family firms as those with significant ownership by a family (Villalonga and Amit, 2006). We then coded these firms as "1", while non-family firms were coded as "0". Subsequently, we re-estimated the model using three sample groups: family, non-family, and the entire sample. The latter group underwent testing using the moderation model. The results are outlined in Table 12, with Columns (1) and (2) displaying the outcomes for the family firms sample, Columns (3) and (4) presenting the findings for the non-family group, and Columns (5) and (6) showcasing the results of the interaction model.

The conclusion remains intact, where CGI is a critical factor in reducing the likelihood of a firm becoming a Zombie, regardless of its family ownership level. Our findings reveal that CGI negatively affects Zombie status across all groups and measurement methods. It implies that a higher CGI leads to a decrease in the likelihood of Zombie. The family ownership

Table 12. The family ownership effects

	Family firms		Non-family firms		Interaction (FAM*CGI) (all samples)	
	CHK [1]	TIE [2]	CHK [3]	TIE [4]	CHK [5]	TIE [6]
FAMILY					4.023***	1.455*
					(0.804)	(0.839)
FAM*CGI					−0.009	0.005
					(0.007)	(0.008)
CGI	−1.900***	−3.050***	−1.824***	−3.579***	−0.016***	−0.037***
	(0.431)	(0.610)	(0.350)	(0.485)	(0.005)	(0.006)
ROA	−0.037***	−0.035***	−0.027***	−0.010***	−0.040***	−0.018***
	(0.010)	(0.010)	(0.007)	(0.003)	(0.007)	(0.005)
GROWTH	−0.003	−0.001	−0.002	0.002	−0.003*	0.003
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
LEVERAGE	−0.007	−0.007	−0.003	0.003	0.004	−0.001
	(0.005)	(0.006)	(0.003)	(0.004)	(0.004)	(0.005)
SIZE	−0.127***	−0.150***	−0.106***	−0.033	0.028	0.049
	(0.038)	(0.054)	(0.031)	(0.036)	(0.086)	(0.108)
AGE	0.274**	0.189	0.424***	0.433***	0.733***	2.586***
	(0.113)	(0.138)	(0.091)	(0.108)	(0.284)	(0.417)
Pseudo R^2	0.05	0.07	0.077	0.074	0.112	0.132
N	1,097	1,097	1,954	1,954	3,051	3,051

Note(s): CHK and TIE are two different measures of Zombie used as the dependent variable. Columns (1) and (2) present outcomes for the family firms sample, while Columns (3) and (4) provide findings for the non-family group. Finally, Columns (5) and (6) illustrate the results of the interaction model. CGI denotes corporate governance index; ROA denotes Returns on Assets; GROWTH denotes the turnover growth; LEVERAGE denotes the debt ratio; SIZE denotes the firm's size; and AGE denotes the lognormal of the firm's age. Figures are the coefficient values except those in the parenthesis, which are robust standard errors values. *, **, and *** denote statistical significance at 10%, 5%, and 1%, respectively

Source(s): Table created by authors

variable shows a positive coefficient (β = 4.023 p-value<0.01 for CHK and β = 1.455 p-value<0.1 for TIE), but the interaction between family ownership and CGI shows no significant effect. It implies that the CGI effects on Zombie have no significant difference between family and non-family firms. Once more, our conclusion stands firm: CGI remains a crucial factor in reducing the likelihood of a firm transitioning into a Zombie status, irrespective of its level of family ownership. Our findings consistently demonstrate a negative association between CGI and Zombie status across all groups and measurement methods, indicating that higher CGI corresponds to a reduced likelihood of encountering Zombie status. Despite the family ownership variable displaying positive coefficients (β = 4.023, p-value<0.01 for CHK, and β = 1.455, p-value<0.1 for TIE), the interaction between family ownership and CGI does not yield a significant effect. This suggests that the impact of CGI on Zombie status does not significantly differ between family and non-family firms.

6. Conclusion

Our main objective is to investigate whether the Corporate Governance Index (CGI) affects the likelihood of companies becoming Zombie firms. We tailored a governance index to fit the Indonesian context and analyzed the governance practices' quality influences on the probability of companies becoming Zombie firms using two different measures. Utilizing data from 339 listed Indonesian firms from 2014 to 2022, our findings indicate that higher CGI is associated with a reduced likelihood of firms becoming Zombies, supporting the agency theory. We addressed potential endogeneity concerns in our model, which confirmed that our conclusions remain robust. Post-hoc analysis further indicated that political connections and family ownership are associated with a higher propensity for firms to become zombies. Nevertheless, even when these factors are present, low CGI consistently increases the likelihood of firms becoming zombies, highlighting the critical role of governance quality.

Overall, the findings are theoretically and empirically consistent with the literature: CGI, a measure of the quality of corporate governance practices, is important for firm Zombieness. We theorized our findings by borrowing the agency theory framework. Indeed, effective control and monitoring are essential if companies aim to avoid financial distress (Lee and Yeh, 2004), bankruptcy (Darrat *et al.*, 2016), and now Zombieness. When oversight is lacking, agents may make decisions under information asymmetry and engage in risky behaviors like accumulating excessive debt to chase short-term gains or mask poor performance. This can compound the company's debt burden. Without effective governance structures to control and monitor the self-interest of debt-seeking behavior of managers through information asymmetry, companies are more susceptible to becoming Zombie firms.

Our research findings significantly contribute to academic literature and practical applications in several ways. Firstly, the findings highlight the importance of utilizing a governance index to assess the impact of governance practices on firm dynamics. Secondly, we highlight the quality of corporate governance practices as a crucial factor in understanding Zombie theory. Furthermore, our findings emphasize that regardless of political connections or family ownership, the quality of governance practices is pivotal for companies to mitigate the risk of becoming Zombie firms. We advocate for companies to enhance their control and monitoring mechanisms, particularly concerning decisions related to debt risk-taking, to prevent the proliferation of Zombies. From a practical standpoint, our findings indicate that policymakers should develop regulations to enhance Corporate Governance Index (CGI) scores, which are linked to a lower likelihood of firms becoming zombies. The Indonesian government has similar regulations for financially distressed companies. Considering the bad effects of zombies, it can have similar regulations for them. Additionally, institutionalizing the CGI as a performance evaluation tool for listed firms can provide a crucial baseline for early warning systems to identify potential zombification. The Indonesian government has periodically reviewed to monitor financial distress companies using the Altman z-score. We suggest having a similar approach for the zombies.

While our study presents a fresh perspective on the impact of the Corporate Governance Index (CGI) on Zombieness, it is important to acknowledge its limitations. Firstly, our CGI is designed specifically for Indonesia's institutional context, which varies significantly from governance frameworks in other countries. As suggested by Black *et al*. (2017), customizing the governance index to fit local conditions is essential for its effectiveness. Future research should investigate the influence of CGI on zombification in other emerging economies, adapting the index to resonate with their unique governance environments.

Secondly, our study does not explore how firms transition between zombieness and financial health. Specifically, we do not examine how the Corporate Governance Index (CGI) might help zombie companies recover or lead them to default, as our methodology focuses solely on determining the impact of CGI on zombification. We encourage future research to investigate these critical pathways. Third, our study does not explore how individual elements of the corporate governance index, such as shareholder rights, equitable treatment, disclosure and transparency, and board responsibility, contribute to zombification. Each of these elements may have distinct roles and varying levels of importance in preventing or contributing to zombification. Future research could address this gap by conducting feature analysis to identify which governance components are most critical in influencing zombification outcomes. Additionally, our study does not account for upper-echelon variables such as CEO power, characteristics, and traits, which could potentially moderate the relationship between CGI and Zombieness. Furthermore, examining this framework within the context of Small and Medium Enterprises (SMEs) would offer additional compelling evidence to enhance the literature.

Notes

(1) The information regarding Indonesia's weak governance practices and their contribution to the proliferation of zombie companies is sourced from: https://www.cnnindonesia.com/ekonomi/20230705064131-92-969580/benarkah-indonesia-dihantui-perusahaan-zombie-seperti-kata-imf/2. It discusses the IMF's concerns about the presence of zombie firms in the country.

(2) The claim that 20% of Indonesian companies are classified as zombie firms is based on anecdotal evidence from a CNN Indonesia article discussing the IMF's views on the issue. https://www.cnnindonesia.com/ekonomi/20230705064131-92-969580/benarkah-indonesia-dihantui-perusahaan-zombie-seperti-kata-imf/2

(3) For the identification strategy of our estimation model, we present the results of our multicollinearity analysis, Principal Component Analysis, and regression with various control variables as supplementary files for the reviewers. These materials are available upon request.

(4) The results of the paired *t*-test with unequal observation of Welch's *t*-test are available upon request. We have attached the document for the reviewers.

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Further reading

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Appendix
Corporate Governance Index (CGI) Items

Rights of shareholders (4 Items)

(1) Assess the quality of the notice to call the annual general shareholders' meeting (RUPS) in the past one year. Does the notice include:

- Appointment of directors and commissioners
- Appointment of auditors
- Dividend payment

(2) Is the decision on the remuneration of the board members (commissioners and directors) approved by the shareholders annually?

(3) Is the remuneration of the board (commissioner and director) presented individually?

(4) Do board members hold more than 25% of outstanding shares?

Equitable treatment of shareholders (4 Items)

(5) Have there been any cases of insider trading involving the company directors and commissioners in the past two years?

(6) Does the company provide rationale/explanation for related-party transactions affecting the corporation?

(7) Has there been any non-compliance case regarding related-party transaction in the past two years?

(8) How many days in advance does the company send out the notice of general shareholders' meeting?

Role of stakeholders (4 items)

(9) Does the company explicitly mention the safety and welfare of its employees?

(10) Does the company explicitly mention the role of key stakeholders such as customers or the community at large (or creditors or suppliers)

(11) Does the company explicitly mention environmental issues in its public communication?

(12) Does the company provide an ESOP (Employee Stock Option Plan) or other long-term employee incentive plan linked to shareholder value creation to employees?

Disclosure and transparency (14 items)

(13) Does the company have dispersed ownership structure?

(14) Assess the quality of financial report in each of the following areas:

- Financial performance
- Business operations and competitive position
- Basis of board remuneration
- Operating risk

(15) Is there any statement requesting the directors to report their transactions of company shares?

(16) Does the company have an internal audit operation established as a separate unit in the company?

(17) Are there any accounting qualifications in the audited financial statements apart from the qualification on uncertainty of situation?

(18) Does the company offer multiple channels of access to information, include:

- Company website
- Analyst briefing
- Press conference/press briefing

(19) Is the financial report disclosed in a timely manner?

(20) Does the company have a website disclosing up-to-date information, include:

- Business operation
- Financial statement

- Press release
- Shareholding structure
- Organization structure
- Corporate group structure
- Downloadable annual report
- Downloadable interim report
- Available of both Indonesian and English

(21) Does the company disclose fees paid to external auditors?

(22) Does the company's Annual Report include a section devoted to the company's performance in implementing corporate governance principles?

(23) If the complete list of BOC members is disclosed, is detailed information on each commissioner disclosed?

(24) If the complete list of BOC members is disclosed, does it include details of previous employment?

(25) If the complete list of BOC members is disclosed, are educational qualifications of commissioners disclosed?

(26) If the complete list of BOC members is disclosed, are other commissionerships of commissioners disclosed?

Responsibility of the board (26 items)

(27) Does the company have its own written corporate governance rules that clearly describe its value system and board responsibility?

(28) Does the board of commissioner provide code of ethics or statement of business conduct to all directors and employees to ensure that they aware of and understand the code?

(29) Is there disclosure of company's guidelines of matters that require approval by the board of commissioner?

(30) Does the annual report include report from board of commissioners?

(31) Does the company have a corporate vision/mission?

(32) Does the IDX/FSA have any evidence of non-compliance of the company with IDX/FSA rules and regulation over the last two years?

(33) Have board members participated in corporate governance training?

(34) Does the company report board meeting attendance of individual board of commissioner members?

(35) How many times board of commissioner meet in the calendar year?

(36) Does the company report board meeting attendance of individual board of director members?

(37) How many times board of director meet in the calendar year?

(38) Among board of commissioners, how many are independent commissioners?

(39) Is the board of commissioner chairman an independent commissioner?

(40) Does the company state in its annual report the definition of independence?

(41) What is the size of board of commissioner?

(42) Is individual performance of BOC members evaluated?

(43) Is criteria for evaluating board of director performance disclosed?

(44) Does the board appoint independent committees with independent members to carry out various critical responsibilities such as:

- Audit committee
- Compensation committee
- Director or nomination committee

(45) Assess the audit committee based on following criteria:

- Audit committee size
- Independent members
- Financial/accounting background
- Chairman

(46) Is disclosure made of the basis of selection of audit committee members?

(47) Does the company disclose audit committee report in the annual report

(48) Assess the quality of the audit committee report in the annual report, include the following items:

- Frequency of meetings
- Internal control
- Management control
- Proposed auditors
- Financial report review
- Legal compliance
- Scope, results, and effectiveness of audits
- Adequacy of internal audit function
- Conclusion or opinion

(49) Is the complete list of audit committee members disclosed?

(50) Does the corporate secretary attend all board of directors meetings?

(51) Does the company provide contact details for a specific investor relation person?

(52) Does/did the company have an option scheme for top management?

Corresponding author
Rayenda Khresna Brahmana can be contacted at: raye_brahm@yahoo.com