CORPORATE GOVERNANCE PRACTICES AND FIRM PERFORMANCE IN THE TECHNOLOGY SECTOR

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Abstract

This study examines the impact of corporate governance on firm performance within listed technology corporations in the Greater Bay Area (GBA) of China, particularly in Hong Kong and Shenzhen. It employs data from the Hang Seng TECH Index and the SME-ChiNext Tech 100 Index covering the period 2016 to 2022 to assess the influence of corporate governance on crucial financial performance metrics such as return on equity (ROE), return on assets (ROA), and Tobin's Q. Despite incorporating five control variables to account for extraneous factors, the analysis reveals no significant correlation between corporate governance practices and the operational or financial outcomes of these companies. Notably, the governance level is recorded at 47.2 percent, underscoring a unique regional governance context. This research enhances understanding of corporate governance's role in the technology sector, echoing the findings of Alzubi and Bani-Hani (2021) on capital structure and Ulfah et al. (2022) onboard structure and earnings management. The insights garnered are particularly valuable for policymakers and investors navigating the dynamic economic landscape of the GBA.

Keywords: Greater Bay Area (GBA) of China, Corporate Governance, Firm Performance, Agency Theory, China's Corporate Governance Code, China Securities Regulatory Commission (CSRC), Corporate Governance Code and Corporate Governance Report (Code), Technology Industry

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1. INTRODUCTION

Corporate governance represents a robust framework of policies, procedures, and regulations that are established to guide the oversight and management of corporations, thereby ensuring transparency and equitable treatment among all stakeholders. This framework is buttressed by contractual agreements that clearly define duties while seeking to diminish potential conflicts of interest, necessitating unwavering

compliance and consistent implementation for effectiveness (Buallay et al., 2017; Alodat et al., 2022). Effective corporate governance not only strengthens organizational integrity, performance, and sustainability but also aligns managerial actions with the broader interests of stakeholders while yielding distinct competitive advantages in the process (Alodat et al., 2022). Furthermore, it supports ethical corporate conduct and even plays a crucial role in enabling foreign enterprises to penetrate the Chinese market successfully (Molnar et al., 2017).

In Hong Kong, the governance of publicly listed companies is regulated by the Corporate Governance Code (Hong Kong Exchanges and Clearing Limited [HKEX], n.d.), which provides guidelines on board composition, independence, structure, competence, and diversity. Compliance with the Code is not mandatory; however, listed companies that do not comply are required to disclose their non-compliance and provide explanations. In contrast, corporate governance in Mainland China mainly focuses on listed companies and state-owned enterprises (SOEs). The Corporate Governance Code, established in 2002 and based on the Organisation for Economic Co-operation and Development (OECD) Principles of Corporate Governance, is applicable to listed companies, whereas SOEs follow a different set of governance principles. Non-listed, non-state companies in China are generally not subject to specific governance regulations, save for some requirements outlined in the Company Law (National People's Congress of the People's Republic of China, 2023), such as the non-mandatory establishment of a board (Molnar et al., 2017).

The strategic blueprint for China's Greater Bay Area (GBA), released in February 2019, aims to transform 11 cities into a leading innovation and development hub. This region includes the Hong Kong and Macao Special Administrative Regions, along with nine municipalities in Guangdong province including Guangzhou and Shenzhen. Hong Kong is highlighted as an international financial centre, integral for fundraising for the "Belt and Road Initiative", due to its history as a former British colony. Nearby and located within the Mainland's borders, Shenzhen is positioned as a burgeoning centre for innovation and technology, also hosting one of China's major stock exchanges.

Using these two major business hubs within the GBA — Hong Kong and Shenzhen — as the localities upon which this study is focused, the research addresses a gap in the current body of literature by analysing the impact of corporate governance on the performance of listed technology companies in Hong Kong and Shenzhen. To specifically measure firm success, it focuses on three critical performance metrics: return on equity (ROE), return on assets (ROA), and Tobin's Q. These indicators are essential for understanding the financial health and market valuation of companies and serve as the basis for our analysis, providing a structured approach to evaluating the effectiveness of corporate governance. The research builds upon prior work by Alzubi and Bani-Hani (2021), who explored the relationship between capital structure and performance in Jordanian-listed firms and aligns with Ulfah et al. (2022), who examined the influence of board structure on earnings management. In this way, this research aims to deepen understanding of effective governance mechanisms and their role in enhancing firm performance in the dynamic GBA business environment.

The remainder of this paper is organized in the following manner. Section 2 provides a review of relevant literature and highlights identified gaps within the existing body of research. Section 3 outlines the research methodology employed in this study. Section 4 presents the results while Section 5 devotes to a discussion of the implications of these results. The paper concludes with Section 6, which summarizes the key findings and proposes potential avenues for future research.

2. LITERATURE REVIEW AND HYPOTHESES DESIGN

Numerous studies affirm the critical role of corporate governance in influencing various performance indicators such as ROE, ROA, and Tobin's Q, thereby enhancing stakeholders' evaluation of organizational success (Buallay et al., 2017; Kyere & Ausloos, 2020; Alodat et al., 2022; Kiel & Nicholson, 2003; Ahmed & Hamdan, 2015; Yip & Pang, 2023). For instance, Chen (2015) found a positive impact of larger board sizes on ROA using a 2003 World Bank dataset, while Liu et al. (2015) observed a reverse trend with smaller board sizes enhancing ROE based on data from the Chinese Securities Market and Accounting Research (CSMAR) database. These insights collectively highlight the complex relationship between governance structures and firm performance, demonstrating variable impacts across different sectors and economic contexts.

In the field of corporate governance research, the technology sector in China, known for its rapid growth and global influence, presents unique challenges and opportunities (Jiang & Kim, 2020). The distinct regulatory frameworks and competitive dynamics in this sector necessitate specialized governance structures, such as adaptive compliance mechanisms and strategic board compositions, to sustain growth and competitive advantage. These structures are designed to address the rapidly changing technological landscape and the stringent regulatory requirements specific to this market, ensuring that firms not only survive but thrive in a highly competitive environment.

As such, the importance of targeted governance research in China's tech industry is underscored by the unique industry dynamics, the changing regulatory environment, and the global significance of Chinese tech firms. It is particularly relevant for global investors and policymakers (Jiang & Kim, 2020; Musa & Yahaya, 2023; Farawansyah et al., 2024).

The relationship between corporate governance and operational and firm performance is a multifaceted subject that has yielded diverse findings across studies. For instance, Marashdeh et al. (2021) conducted a study on non-financial institutions in Jordan from 2008 to 2019 using random effects regression analysis. The findings revealed a negative impact of chief executive officer (CEO) duality on performance, aligning with arguments put forth by Rechner and Dalton (1991). Additionally, smaller boards were found to enhance performance, which echoes the observations made by Yermack (1996). Similarly, the presence of non-executive directors (NEDs) was found to positively influence monitoring functions, consistent

with the insights provided by Weir and Laing (2001) and Abdullah (2004). However, it should be noted that Marashdeh et al.'s (2021) study has certain limitations, such as the exclusion of other sectors, variations in the operationalization of variables like board meetings, and a lack of comparisons with similar emerging markets.

Other prior studies have identified substantial variations in governance characteristics such as board size, CEO duality, CEO tenure, and the presence of NEDs. These findings resonate with seminal research in the field of corporate governance conducted by Fama and Jensen (1983), Dalton et al. (1998), Lipton and Lorsch (1992), Morck et al. (1988), Adams et al. (2005), Abdullah (2004), and Abdullayev (2022). This body of research not only provides specific insights into governance structures in various national contexts but also underscores the necessity for more expansive studies that incorporate additional sectors and variables. Such broader research endeavors are essential to a deeper understanding of how corporate governance influences firm performance across different economic and regulatory environments.

Taking a narrower approach in their research, Ulfah et al. (2022) investigated the impact of board structure on earnings management in Indonesian firms before and during the COVID-19 pandemic. The findings indicated that only board size had a significant influence on earnings management, with larger boards being less effective before the pandemic but more effective during it. This highlights the evolving role of board structures during economic crises. Despite its contribution to the existing literature, the study's focus on a single country and the exclusion of financial firms limit its generalizability, emphasizing the need for cross-country analyses.

Studies exploring the relationship between ownership structure and firm performance have yielded varied results across different countries. For example, Al-Matari et al. (2012) found no significant relationship between family ownership and firm performance in Saudi-listed companies, while Khamis et al. (2015) reported a negative impact of institutional ownership and a positive effect of managerial ownership in Bahraini-listed companies. Onakoya et al. (2014) discovered a positive relationship between ownership structure and board size with ROE, but a negative association with ROA in Nigerian banks. Chaghadari and Chaleshtori (2011) identified several ways in which corporate governance mechanisms impact bank performance, including negative effects from loan deposit ratios and poor asset quality, as well as negative associations with ROE and ROA in Malaysian firms. In contrast, Sami et al. (2011) found a positive relationship between corporate governance measures and operational performance in China. Interestingly, some studies did not yield statistically compelling evidence that corporate governance variables influence the performance of listed firms, such as that conducted by Onyina and Gyanor (2019) in the context of the Ghana Stock Exchange.

The present study explores the relationship between corporate governance and operational performance in the Guangdong-Hong Kong-Macao GBA of China, using ROE and ROA as performance indicators. The hypothesis posited is that the adoption of corporate governance has no significant impact on operational performance, with a specific focus on GBA-listed companies due to their economic significance and ongoing governance reforms. Therefore, the first hypothesis is as follows:

H1: There is no significant impact of corporate governance adoption on a firm's operational performance.

The interconnection between corporate governance structures and financial outcomes has been the focus of substantial academic investigation. For example, previous studies, such as those by Mitton (2002) and von Nandelstadh and Rosenberg (2003), have illustrated the positive role of corporate governance during financial downturns, enhancing firm profitability during crises. Indeed, researchers have consistently demonstrated that governance elements such as board composition, firm size, significant shareholders, and audit committees substantially influence corporate performance (Najjar, 2012; Gupta & Sharma, 2014; Afrifa & Tauringana, 2015; Danoshana & Ravivathani, 2019). However, the effects of these mechanisms vary across different sectors and regions, indicating the necessity for research that is more nuanced and adapted to specific contexts.

In examining financial structuring within the Middle East, Alzubi and Bani-Hani (2021) analyzed how the debt-to-equity ratio affects Jordanian industrial firms, linking their findings to several financial theories, including the pecking order and trade-off theories. This study indirectly touches upon aspects of corporate governance, as the management's decision-making process in choosing between debt and equity financing reflects underlying governance principles and practices. However, critiques of their study highlighted methodological weaknesses and a small sample size, which may hinder the generalizability of the findings. These critiques underscore the need for a more robust methodology that explicitly incorporates corporate governance variables to clarify how governance practices influence financial structuring decisions. This approach would bridge the noted gap in the literature and allow for a more comprehensive comparison with prior works.

In their comprehensive review of competitiveness in manufacturing firms, Konstantinidis et al. (2022) synthesized findings from 50 studies, revealing complex relationships among profitability, market share, and other economic factors. This review also sheds light on how corporate governance practices influence these relationships, emphasizing the role of governance in shaping strategic decisions that drive competitiveness and economic performance. Despite its breadth, the review was limited by its search strategy and the depth of methodological scrutiny, underscoring the need for more rigorous analytical frameworks in literature reviews. A more explicit focus on the integration of corporate governance practices into the analysis would not only clarify their impact but also enhance the depth and applicability of the findings in understanding the governance factors that contribute to firm competitiveness.

Building on these foundations, this study explores the influence of corporate governance on financial performance specifically within the dynamic economic area of the GBA, a crucial center for

innovation. This research evaluates the effectiveness of corporate governance through performance metrics like ROE and ROA (Onyina & Gyanor, 2019). The hypothesis tested in this context is:

H2: There is no significant impact of corporate governance adoption on a firm's financial performance.

Research on the relationship between corporate governance and firm performance has been pursued globally using a variety of performance metrics. Fallatah and Dickins (2012) found a positive association between corporate governance and firm valuation in Saudi Arabia, assessed through Tobin's Q. Similarly, Al-Ghamdi and Rhodes (2015) noted a positive relationship between family ownership and governance in the same context. Conversely, Al-Matari et al. (2012) reported no significant effects of internal governance mechanisms on the performance of Saudi firms. For Bahraini firms, Khamis et al. (2015) observed a negative correlation between institutional ownership and performance, whereas managerial ownership showed a positive impact, both evaluated using Tobin's Q. Siddiqui (2015) corroborated the positive influence of external governance measures like anti-takeover provisions on firm value in his meta-analysis.

In light of these findings, this study explores the influence of corporate governance on market performance within firms listed in the Guangdong-Hong Kong-Macao GBA, utilizing ROE and ROA as indicators. This investigation culminates in the articulation of the following hypothesis:

H3: There is no significant impact of corporate governance adoption on a firm's market performance.

The literature underscores the significant role of corporate governance in enhancing organizational performance and sustainability, with its effectiveness varying significantly across different regional and sectoral contexts. This variability highlights the need for governance studies to be adapted to specific cultural and contextual nuances, particularly in rapidly changing sectors like China's technology industry. Investigating governance within this context not only fills a crucial academic gap but also offers important insights for stakeholders in this dynamic industry. Such research also provides a comparative framework for understanding

effective governance in other emerging markets undergoing similar technological transformations (Akpan et al., 2023; Kyere & Ausloos, 2020; Hermuningsih et al., 2020; Jiang & Kim, 2020).

The relationship between corporate governance and performance is complex, with studies showing varied and sometimes conflicting results. This underscores the importance of context-specific research that accounts for industry, national, and economic specifics. The influence of governance mechanisms also differs across various performance indicators, necessitating a multi-dimensional analytical approach. Future research should aim to bridge these gaps, enhancing the understanding of governance's impact on performance across different settings (Buallay et al., 2017; Liu et al., 2015; Alodat et al., 2022; Yip & Pang, 2023).

3. RESEARCH METHODOLOGY

3.1. Study variables

The dataset utilized in this study encompasses all 30 listed stocks included in the Hang Seng TECH Index on the HKEX, as well as 30 listed stocks in the SME-ChiNext Tech 100 Index on the Shenzhen Stock Exchange. In order to rank the firms from the SME-ChiNext Tech 100 Index, their registered capital size was taken into consideration. Firms that maintained a parent-subsidiary relationship with any company listed in the Hang Seng TECH Index were excluded from the ranking process. Subsequently, the 30 largest firms were selected for analysis (Yip & Pang, 2023). Data for the period ranging from 2016 to 2022 was acquired from the databases of the HKEX and Shenzhen Stock Exchange.

To examine the impact of corporate governance on various aspects of firm performance, this study investigates the effects on financial performance, operational performance, and market performance. Three proxies, namely ROE, ROA, and Tobin's Q, are employed as dependent variables in the regression model. ROE is utilized as a measure of financial performance, ROA as a measure of operational performance, and Tobin's Q as a measure of market performance (Yip & Pang, 2023).

Table 1. Variables and their definitions

Variable name	Meaning of the variable	Measure of the variable
Dependent variables		
ROE	Financial performance	Net income / Shareholder's equity
ROA	Operational performance	Net income / Total assets
Tobin's Q	Market performance	(Market value of equity + Book value of liabilities) / Book value of total assets
Independent variables		
CG1	Ownership of the largest shareholder	0 if the shareholder has shares of more than 20%, 1 otherwise
CG2	Ownership of the largest three shareholders	0 if the largest three shareholders have shares of more than 50% combined, 1 otherwise
CG3	Size of the board of directors	0 if the board members are not between 7 and 13 members, 1 otherwise
CG4	Independence of the board of directors	0 if the members of the board of directors are not comprised of more than 50% independent outside directors, 1 otherwise
CG5	Posts of chairman and CEO	0 if the chairman is the same as the CEO, 1 otherwise

This study examines a range of independent variables that are relevant to the analysis of cash dividend payouts and over-investment. The independent variables under consideration encompass the ownership of the largest shareholder, ownership of the three largest shareholders, the size of the board of directors, the independence of

the board of directors, and the positions of the chairman and CEO. To account for potential confounding factors, several control variables are included in the analysis. These control variables consist of firm size, firm age, external auditor quality, and fixed effects for the year, firm, and industry.

3.2. Study model

This investigation formulates three hypotheses and constructs a rigorous model to test their validity. Building upon Buallay et al.'s (2017) examination of the nexus between corporate governance and organizational performance in Saudi Arabia, this study adopts a similar analytical framework while also incorporating innovative elements from the research conducted by Alzubi and Bani-Hani (2021). This integrated methodology is devised to provide a detailed scrutiny of the proposed hypotheses. To determine the relationship between corporate governance and firm performance in corporations listed in Hong Kong and Shenzhen, this study applies specified linear regression models:

$$Perf_{it} = \beta_0 + \beta_1 CG1_{it} + \beta_2 CG2_{it} + \beta_3 CG3_{it} + \beta_4 CG4_{it} + \beta_5 CG5_{it} + \beta_6 LnAssets_{it} + \beta_7 Age_{it} + \beta_8 Big4_{it} + \beta_9 BSize_{it} + \beta_{10} Sector_{it} + \varepsilon_i \quad (1)$$

where,

• $Perf_{it}$ — is considered a continuous variable, and in this study, it serves as the dependent variable. Firm performance is measured using three models: a) ROA_{it} — this model calculates the return on assets, which is the ratio of net income to total assets for the company (i) during the period (t); b) ROE_{it} — this model uses the return on equity, which is the ratio of net income to shareholders' equity, as the dependent variable for the company (i) during the period (t); c) *Tobin's Q$_{it}$* — this model employs the ratio of current liabilities plus the market value of share capital to total assets as the dependent variable for the company (i) during the period (t);

• β_0 — the constant term in the model;

• β_{1-10} — the slopes of the control variables and independent variables;

• $CG1_{it}$ — this dummy variable is assigned a value of 0 if a shareholder owns more than 20% of the shares and 1 if they own 20% or less for the company (i) in period (t);

• $CG2_{it}$ — this dummy variable is assigned a value of 0 if the shareholders collectively hold more than 50% of the shares, and 1 otherwise, for the company (i) during the period (t);

• $CG3_{it}$ — this dummy variable is set to 0 if the number of board members does not fall within the range of seven to 13, and it is set to 1 if it does, for the company (i) during the period (t);

• $CG4_{it}$ — this dummy variable is assigned a value of 0 if less than 50% of the board of directors are independent outside directors, and 1 if 50% or more are independent, for the company (i) during the period (t);

• $CG5_{it}$ — this dummy variable is assigned a value of 0 if the chairman and CEO positions are held by the same individual, and 1 if these positions are held by different individuals, for the company (i) during the period (t);

• $LnAssets_{it}$ — this variable represents the natural logarithm of the total assets of the company (i) during the period (t);

• Age_{it} — this continuous variable measures the number of years since the company (i) was established, as of period (t);

• $Big4_{it}$ — this dummy variable is assigned a value of 1 if the company's external auditor is one of the Big Four audit firms, and 0 otherwise, for the company (i) during the period (t);

• $BSize_{it}$ — this continuous variable represents the number of members on the board of directors for the company (i) during the period (t);

• $Sector_{it}$ — this dummy variable is assigned a value of 1 if the company operates within a specific sector, characterized by similar fields of work or related products and services, and a value of 0 otherwise, for the company (i) during the period (t);

• ε_i — it represents the random error term, accounting for unobserved factors that affect the dependent variable in the model for company (i).

The selection of specific control variables for this study is influenced by prior studies that demonstrated their relevance to the dependent variables explored. Including these variables aims to mitigate the risk of omitted variable bias, which could otherwise affect the clarity of the relationships between cash dividend payouts and over-investment. This strategic inclusion enhances the validity of the analysis and allows for a more nuanced understanding of the interactions between independent and dependent variables. This methodical approach ensures that the study adheres to rigorous and comprehensive research standards.

4. RESEARCH RESULTS

4.1. Dependent variables

This study explores the effects of corporate governance on various facets of organizational effectiveness, including financial, operational, and market outcomes. Utilizing a framework established by Buallay et al. (2017), the analysis employs three principal indicators as proxies to evaluate *ROE*, *ROA*, and *Tobin's Q*. These indicators function as the dependent variables across distinct regression models. In detail, *ROE* is selected to analyze financial performance, *ROA* is applied to examine operational efficiency, and *Tobin's Q* is used to assess market valuation, in accordance with the research findings of Danoshana and Ravivathani (2019) and Kiel and Nicholson (2003).

4.2. Independent variables

This study focuses on analyzing corporate governance through several essential structural dimensions, including the ownership stakes of the largest and top three shareholders, board size and independence, and whether the chairman and CEO roles are distinct. This framework is supported by research from scholars such as Akhtaruddin et al. (2009), Hamdan and Al-Sartawi (2013), Barros et al. (2013), Bouaziz (2014), and Buallay et al. (2017).

Table 2 displays the average percentages for each corporate governance dimension. The first dimension, *CG1*, relates to the largest shareholder's ownership, with an average of approximately 47.6%. This indicates that in GBA technology companies, the largest shareholders often control more than 20% of shares. Conversely, 52.4% of cases show less than 20% ownership by the largest shareholder. When placed into the historical context of East Asia, where from the 1950s through the 1970s more

than 65% of publicly listed companies were controlled by major shareholders with familial ties often influencing key management roles, a phenomenon particularly observed in Hong Kong (Lee & Barnes, 2017), these findings suggest that many GBA technology firms are likely family-owned, with significant shares held by key stakeholders who exert considerable influence over the strategic and operational decisions of these companies (Buallay et al., 2017).

The second governance dimension, *CG2*, assesses the joint ownership of the three largest shareholders, with an average stake of 69.5%. This indicates that in most cases, these shareholders collectively own less than half of the company's shares, suggesting distributed control among multiple shareholders. This distribution promotes robust monitoring by other shareholders, thereby enhancing corporate governance (Buallay et al., 2017). Additionally, the findings show that no single shareholder controls more than 50% of the shares, which contributes to stabilizing stock prices and reducing market volatility.

The third corporate governance dimension, *CG3*, assesses board composition, focusing on optimal board size, defined as seven to 13 members. The findings indicate that 48.8% of boards fit within this range, while 51.2% do not, having either more than 13 or fewer than seven members. Such deviations from the ideal size may hinder effective decision-making and consensus-building, suggesting that over half of the companies may not be adhering to best governance practices, potentially impacting their strategic effectiveness and resource management (Buallay et al., 2017).

The fourth corporate governance dimension, *CG4*, addresses board independence, revealing an average independence level of 14.6%. This indicates that in the majority of cases (85.4%), boards do not meet the threshold of having over 50% independent directors. Such low levels of independence may reduce transparency and increase the likelihood of conflicts of interest (Buallay et al., 2017).

The separation of the roles of chairman and CEO, referred to as *CG5*, constitutes the final dimension of corporate governance examined in this research. Role duality, where a single individual holds both the chairman and CEO positions, is often criticized for potential conflicts of interest and greater risk of less transparent disclosures. The chairman's role involves governing the board, whereas the CEO is responsible for the daily operational management and the execution of board policies (Buallay et al., 2017). Khiari (2013) contends that combining these roles could negatively impact decisions related to maximizing shareholder value. Additionally, Abbadi et al. (2016) argue that distinct roles can improve the effectiveness of governance. The study finds that in 44.3% of the sampled companies, the roles of chairman and CEO are separate, indicating that less than half of the companies adhere to this aspect of corporate governance best practice, which Bouaziz (2014) links to enhanced governance effectiveness. This suggests that a majority of listed GBA technology companies might be at risk of compromised governance quality due to role duality.

4.3. Control variables

This research utilizes five control variables across all its regression models to ensure robustness in the findings. These control variables are firm size, defined by total assets, firm age (Ahmed & Hamdan, 2015), the size of the board of directors (Guo & Kga, 2012), the presence of an external auditor (Yaşar, 2013; Barros et al., 2013), and the industry sector of the firms. The operationalization of the dependent, independent, and control variables is detailed in Table 2, which provides a comprehensive summary of how each variable is measured in the study.

4.4. Corporate governance, size and performance: A preliminary analysis

This research assesses the impact of corporate governance quality on firm performance. Firms were segmented into two categories — high and low governance — according to the median value of the corporate governance index, as suggested by Buallay et al. (2017) and delineated in Table 3, Panel A.

Utilizing t-statistics and z-statistics for analysis, it was found that companies in the high governance group displayed significantly better operational outcomes, particularly a higher *ROA*. These results highlight the beneficial effects of strong governance practices on organizational efficiency.

Conversely, in the domain of financial performance, as expressed by *ROE*, no significant differences were found between firms with varying levels of governance. However, the analysis of market performance through *Tobin's Q* indicated that all firms generally exhibited a *Tobin's Q* value below 1, signifying undervaluation. Interestingly, firms with higher governance levels showed more pronounced undervaluation, a trend also noted by Ahmed and Hamdan (2015) and Yip and Pang (2023).

Additional analysis assessed the impact of corporate governance across different performance metrics such as *ROE, ROA*, and market performance, particularly *Tobin's Q*. The results indicated that, while the differences in operational and financial performance, such as *ROA* and *ROE*, across governance levels were present, they were minor and not significant enough to suggest a need for policy change. However, the analysis did reveal substantial variation in market performance, particularly in *Tobin's Q*. This suggests a more complex interplay between corporate governance, firm size, and market valuation, where governance may play a more pronounced role in aspects of market perception and valuation rather than in direct financial metrics.

The influence of firm size on performance was also examined, categorizing firms as either large or small based on a median asset threshold of RMB 5,386,069,348,000 (renminbi — RMB), as established by Hamdan and Al-Sartawi (2013), Yip and Pang (2023), and Ahmed and Hamdan (2015). Using t-statistics and z-statistics, significant differences in performance metrics (*ROE, ROA*, and *Tobin's Q*) were observed, emphasizing the substantial impact of firm size on performance outcomes.

Further statistical analysis was conducted to assess the significance of differences in the mean values of financial performance (*ROE*), operational

performance (*ROA*), and market performance (*Tobin's Q*) using t-statistics and z-statistics. While no significant variance was found in financial performance, operational performance and market performance exhibited considerable differences.

The research also included an analysis of the 25th and 75th percentiles (first and third quartiles respectively) of corporate governance standards. The analysis, detailed in Table 3, Panel B, of the 25th and 75th percentiles of corporate governance standards revealed a paradoxical relationship at higher governance levels. Firms in the upper quartile exhibited higher *ROE* and *ROA*, indicating a negative correlation between stringent governance and operational returns. This may result from increased costs due to strict oversight and compliance, conservative decision-making, and resource diversion from operational activities to governance. Regarding market performance, as measured by *Tobin's Q*, the findings indicated undervaluation across governance levels, which was consistent with findings at the median level, pointing to a pervasive market undervaluation regardless of governance standards.

Analysis of firm size at the 25th and 75th percentiles showed that larger firms, particularly those in the top quartile, exhibited an increase in *ROE* but a decline in *ROA*. This discrepancy could be due to factors such as greater capital access, increased leverage, bureaucratic inefficiencies, and intense scrutiny from investors prioritizing short-term financial metrics. The study reveals a nuanced interaction between corporate governance and firm size, impacting diverse performance metrics. This analysis is particularly significant in understanding the detailed dynamics of firm valuation and performance, with a notable emphasis on larger corporations.

Table 2. Variables labels, measurement and description

Labels	Variables	Measurements	Descriptive statistics		
			Mean	*Std. dev.*	*Jarque-Bera (p-value)*
		Dependent variables			
ROE	Financial performance	Is defined as the quotient of net income and shareholder's equity.	0.082	0.223	0.696***
ROA	Operational performance	Is the ratio of net income to total assets.	0.035	0.187	0.672***
Tobin's Q	Market performance	Is the sum of the market value of equity and the book value of short-term liabilities, divided by the book value of total assets.	0.593	0.484	0.324***
		Independent variables (dummy variables)			
CG1	Ownership of the largest shareholder	Ownership of the largest shareholder is coded as 0 if a shareholder possesses more than 20% of the shares and is coded as 1 if no single shareholder's holdings exceed this threshold.	0.476	0.500	
CG2	Ownership of the largest three shareholders	The coding for the ownership concentration among the largest three shareholders is designated as 0 if their combined shareholdings exceed 50% and as 1 if this collective share does not surpass the 50% threshold.	0.695	0.461	
CG3	Size of the board of directors	The size of the board of directors is coded as 0 if the number of board members falls outside the range of seven to 13 and as 1 if the number of board members is within this specified range.	0.488	0.501	
CG4	Independence of the board of directors	The independence of the board of directors is assigned a code of 0 if less than 50% of the board members are independent external directors and a code of 1 if independent external directors constitute 50% or more of the board.	0.146	0.354	
CG5	Posts of chairman and CEO	The variable indicating the separation of the roles of chairman and CEO is coded as 0 if the positions are held by the same individual and as 1 when the roles are occupied by different individuals.	0.557	0.498	
		Control variables			
Assets	Firm size	The aggregate assets possessed by the company.	9,829,084	6,673,131	0.930***
Age	Firm age	The duration in years since the establishment of the company.	15.817	5.636	0.942***
Big4	Auditing quality	The company's external auditing services are provided by one of the big four audit firms: KPMG, Ernst & Young (E&Y), PricewaterhouseCoopers (PwC), or Deloitte.	0.280	0.450	0.148***
BSize	Size of the board of directors	The count of members constituting the company's board of directors.	9.752	2.886	0.813*
Sector	Specific industry sector	The variable is derived from the industry classification data of the companies. Since this study exclusively focuses on the technology sector, this variable will uniformly indicate the same sector for all entries.			

*Note: Normality assessment of data: The distribution of the dataset was evaluated for normality using the Jarque-Bera test, as proposed by Jarque and Bera (1987). The analysis revealed that both the dependent and control variables in the study are normally distributed. This conclusion is supported by p-values greater than 0.050, indicating non-rejection of the normality hypothesis. The significance of these p-values is annotated as * 10%, ** 5%, and *** 1%. In the realm of statistics, the standard deviation serves as a metric to quantify the variation or dispersion of data points relative to their mean. A higher standard deviation signifies a broader dispersion of values around the mean, whereas a lower standard deviation indicates that the values are more tightly clustered around the mean.*

Table 3. Advanced descriptive analysis

Performance	Corporate governance level				Firm size			
	With		Difference tests		With		Difference tests	
	High CG	Low CG	t-statistic	z-statistic	Large firms	Small firms	t-statistic	z-statistic
Panel A: Median								
ROE	0.081	0.081	-0.0002 (0.029)	-0.0001 (0.128)	0.090	0.072	-0.6242 (0.029)	-0.1395 (0.128)
ROA	0.050	0.021	-1.203 (0.024)	-0.225 (0.128)	0.056	0.013	-1.8107 (0.024)	-0.3375 (0.128)
Tobin's Q	0.550	0.627	1.2395 (0.062)	0.5994 (0.128)	0.530	0.660	2.1136 (0.061)	1.0161 (0.128)
Panel B: 25th and 75th percentiles								
ROE	0.047	0.078	0.235 (0.026)	-0.0235 (0.106)	0.084	0.111	0.215 (0.023)	0.215 (0.119)
ROA	0.020	0.043	1.515 (0.024)	1.515 (0.128)	0.033	0.039	0.195 (0.027)	0.195 (0.102)
Tobin's Q	0.723	0.488	-1.872 (0.057)	-1.872 (0.130)	0.583	0.578	-0.038 (0.054)	-0.038 (0.112)

Note: CG — corporate governance. The t-statistic is obtained from the parametric two-independent sample t-test, utilized to determine if the population means of two independent groups are statistically equivalent. Conversely, the z-statistic originates from the non-parametric Kolmogorov-Smirnov Z-test, which facilitates the comparison of a sample distribution with a specified reference distribution, often the standard normal distribution. The magnitude of the t-value indicates the extent of difference between the two groups being compared. A t-value closer to zero suggests a smaller difference between the groups, while a t-value farther from zero indicates a greater difference. When the t-statistic is negative, it signifies that the mean of the first group is lower than the mean of the second group. The p-value, often set at a significance level of 0.05, is used to determine the statistical significance of the t-statistic. If the p-value exceeds 0.05, the difference between the two groups is considered non-significant. In practice, the emphasis is primarily placed on the p-value rather than the t-value itself.

5. DISCUSSION OF THE RESULTS

This research explores the dimensions of corporate governance within technology firms listed on the Hong Kong and Shenzhen Stock Exchanges, an area of study crucial for understanding the broader implications of governance practices in the GBA. Moreover, the strategic initiatives by the Capital Market Authority of Mainland China and local authorities in Shenzhen and Hong Kong aim to bolster a robust financial framework, making the study of corporate governance compliance within these sectors particularly pertinent.

The findings indicate an average compliance rate of 47.2% with a standard deviation of 0.4628 among the surveyed firms, which is considerably lower than expected. This rate is substantially below the compliance levels observed in other regions, such as the 64.1% rate reported in Saudi Arabia by Buallay et al. (2017). The statistical analysis further underscores this issue, with a p-value below 0.05 suggesting that fewer than half of the firms fully meet governance requirements. This scenario is concerning, especially given the potential risks associated with non-compliance, including financial crises and fraud, as underscored by Htay et al. (2013).

The analysis of firm performance in relation to corporate governance standards revealed that higher governance levels correlate positively with operational performance metrics such as ROA. This aligns with the findings of Kyere and Ausloos (2020), who noted similar impacts on financial metrics for companies listed on the London Stock Exchange. Furthermore, extending these insights to emerging markets, Ayeni-Agbaje et al. (2024) identified a positive linkage between stringent governance standards and improved market performance indicators in Nigerian firms. These findings collectively highlight the complex yet generally positive effects of robust corporate governance mechanisms on firm performance.

Significant differences in performance metrics based on firm size are noted, with larger firms showing a decline in ROA but an increase in ROE. This suggests that while larger firms benefit from greater financial leverage, they may also encounter operational inefficiencies, a finding consistent across various geographic and market settings. The intricate dynamics between firm size, governance, and performance emphasize the role of contextual and firm-specific factors in shaping the effectiveness of governance structures.

The development of a corporate governance culture in Hong Kong and Shenzhen since the early 1990s, with the establishment of regulatory bodies like the China Securities Regulatory Commission (CSRC) and the Hong Kong Corporate Governance Committee, reflects a long-standing commitment to improving governance standards. However, the observed average compliance rate of 47.2% in the high-risk innovation and technology sector points to unique industry-specific challenges. This suggests that while regulatory frameworks have evolved, their effectiveness and adaptability to high-innovation sectors remain areas for further enhancement.

This discussion merges the findings from the current study with broader research to paint a comprehensive picture of the state of corporate governance among technology firms in Hong Kong and Shenzhen. The low compliance rates coupled with the positive impact of governance on firm performance underscore the need for enhanced regulatory frameworks and governance practices tailored to the unique needs of the innovation-driven sectors. Enhancing governance standards is not only crucial for firm performance but also vital for maintaining stability and confidence in the financial markets of the GBA. These insights should guide future regulatory adjustments and encourage firms to adopt more rigorous governance practices to mitigate risks and enhance operational and market performance.

6. CONCLUSION

This study was designed to assess the adherence to corporate governance protocols among technology firms listed on the Hong Kong and Shenzhen Stock Exchanges and to determine the impact of these governance practices on the operational, financial, and market performance of these entities. The research revealed a corporate governance compliance rate of 47.2%, indicating a moderate adoption of governance practices within the technology sector of the GBA. This finding suggests significant room for improvement in the governance frameworks within this dynamic economic region.

The analysis incorporated both cross-sectional and time series data covering the period from 2016 to 2022, with a sample comprising 60 technology companies. This comprehensive dataset, resulting in 399 data points, allowed for a robust examination of governance impacts on key performance metrics such as ROE, ROA, and Tobin's Q. Despite this extensive data, the study did not find a significant impact of corporate governance on the performance of firms listed on the Hong Kong and Shenzhen Stock Exchanges. This suggests that while corporate governance is crucial, it may not alone be sufficient to drive performance improvements in high-innovation sectors.

Several limitations must be acknowledged that might affect the interpretation of the results. The scope of this study was confined to technology companies within the GBA, potentially limiting the extrapolation of these findings to other industries or geographic regions. Hence, caution is advised when applying these results beyond the studied context. Moreover, while the analysis was based on a predefined set of corporate governance metrics and control variables, incorporating a wider range of factors could yield a more detailed understanding of the nexus between corporate governance and organizational performance.

Future research could benefit from adopting longitudinal methodologies to explore the persistent implications of corporate governance over time. This approach would help capture the evolving dynamics of corporate governance and its prolonged effects on corporate performance, providing deeper insights into the effectiveness of governance practices.

Given the historical context and the current challenges identified, regulatory authorities such as the CSRC and the Hong Kong Corporate Governance Committee must focus on enhancing corporate governance standards. Strategies to mitigate issues related to ownership concentration and to increase the proportion of independent directors on boards could facilitate reduced agency costs and improved firm performance. These changes could protect the interests of minority shareholders and strengthen the overall corporate governance framework, enhancing the stability and growth potential of firms within the GBA.

The analysis highlights that the GBA faces distinct challenges in corporate governance compliance, especially within the technology sector. There is, however, substantial evidence suggesting that effective governance can significantly boost firm performance. Therefore, addressing the compliance gaps and enhancing governance standards are essential measures for sustaining economic growth, protecting investors, and improving the overall stability of the capital markets in one of Asia's most dynamic economic regions.

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