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CSR, Digital Transformation, and Internal Control: Three-Way Interaction Effect on the Firm Value of Chinese Listed Companies

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Abstract: CSR has become a key issue for the qualitative growth of the Chinese economy, while digital transformation has emerged as a crucial strategy for enhancing company competitiveness. Thus, the complex impact of CSR and digital transformation on the firm value is an important research topic. This study analyzes the moderating effect of digital transformation and the three-way interaction effect of internal control on the CSR–firm value relationship. A hierarchical multiple regression analysis of Chinese listed companies shows a significant positive relationship between CSR and the firm value and a positive moderating effect of digital transformation on the CSR–firm value relationship. According to the three-way interaction analysis results, internal control strengthens the moderating effect of digital transformation, which strengthens the positive relationship between CSR and the firm value. This study has academic value as the first to present and empirically analyze a research model on the complementary effects of CSR, DT, and internal control on the firm value. It also presents corporate strategies to respond to changes in the business environment and provides political implications for promoting corporate and social development together.

Keywords: corporate social responsibility; digital transformation; firm value; internal control; three-way interaction

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1. Introduction

Corporate social responsibility (CSR) is a business model in which a company makes a concerted effort to operate in a way that enhances, not degrades, society and the environment. It can help to improve society and promote a company's positive brand image. Carroll [1] proposed a pyramid model of corporate social responsibility with four levels: economic responsibility, legal responsibility, ethical responsibility, and philanthropic responsibility. In this model, legal responsibility represents the minimum requirement that companies must comply with. However, as stakeholders' expectations have risen recently, issues that were previously considered ethical responsibilities are now being regulated as legal responsibilities. For instance, employing female employees and prohibiting discrimination was an ethical matter in many countries in the past, but it is now legally mandated. This is because stakeholders who emphasize CSR have increased due to factors such as strengthening the importance of sustainability, the globalization of corporate activities, the development of information technology, and increasing the importance of brand value. CSR has now become a strategy to increase the firm value and performance, rather than just a passive means of dealing with crises.

To practice CSR more effectively and efficiently, companies are utilizing digital transformation in the process of implementing strategies for social responsibility. Digital transformation refers to corporate transformation based on digital technology [2]. Such cases

can easily be found in corporate management processes, including environmental management. For example, faced with pressure from environmental groups to purchase palm oil only from producers that do not destroy forests, Unilever developed an AI monitoring solution for palm oil production based on data collected through satellite and GPS technology [3]. This is a case of practicing CSR through digital transformation in the raw material procurement process. Additionally, many manufacturing companies are practicing social responsibility in their supply chains through digital transformation. Educational institutions have also made it easier for more people, including the poor, to access educational content through digital transformation. In summary, more companies in various industries are using digital technology to promote CSR, thereby implementing social and environmental responsibilities more effectively and efficiently.

In this context, CSR is a mechanism for management to make decisions that comprehensively consider the interests of investors, employees, customers, suppliers, governments, and other stakeholders. CSR helps build investors' trust, increases employee enthusiasm and customer satisfaction, enhances suppliers' willingness to cooperate, and improves corporate competitiveness through government support and subsidies. However, owing to differences in cultural background and economic development, CSR levels in developing countries are lower than in developed countries [4].

China announced the Corporate Social Responsibility Report Guidelines in 2009 and strengthened the requirements for CSR in 2018. Additionally, the standards of information disclosure were raised to enable listed companies to discharge their social responsibilities more actively. The Securities Supervisory Commission announced the revised Listed Company Governance Guidelines to disclose related information. Following these changes, CSR was recognized as an urgent requirement for social development and corporate growth [5], and a greater number of companies commenced efforts for its implementation.

Meanwhile, the 2030 Sustainable Development Agenda adopted at the UN Sustainable Development Summit in 2015 emphasized the significance of promoting global sustainable development using digital technology. With the expansion of the scale of the digital economy, the digital transformation of companies has been a significant factor influencing the global economy. In particular, this phenomenon has significantly impacted manufacturing companies, which have complex supply chains and experience significant pressure regarding new technologies and production methods compared to those in the service industry [6]. Therefore, in China, where the manufacturing sector accounts for a high proportion of the real economy, the government has been actively promoting the digital transformation of companies over the past few years [7].

The Chinese government included the "digital economy" as a major topic of work report in 2017. In 2020, digital transformation, presented as the official development direction for companies, was formalized as a national-level strategy, becoming an inevitable element of high-quality development for companies. According to the White Paper on China's Digital Economy Development (2021), the size of China's digital economy in 2020 was approximately CNY 39.2 trillion, accounting for 38.6% of the gross domestic product—a rapid increase compared to 36.2% in 2019 [8]. Digital transformation promotes the acquisition of valuable knowledge and scarce resources, facilitating the integration and reorganization of internal and external resources to form unique resources that are difficult to imitate and replicate [9–11]. Thus, digital transformation has become a competitive strategy for enhancing operational efficiency, meeting diverse market demands, and improving corporate performance [12,13]. It contributes to innovation in the environmental, social, and governance sectors [14].

To achieve sustainable competitive advantage and improve firm value, it is advisable that companies actively pursue CSR and digital transformation [15]. However, companies possess limited resources, and therefore, decision-making for the optimal allocation and application of resources is crucial to simultaneously promote CSR and digital transformation. Additionally, to fulfill social responsibilities, such as technological advancements for

environmental improvements, it is essential to establish and execute strategies that effectively leverage digital transformation. To achieve this goal, it is paramount to establish and utilize an effective internal control system.

Internal control is a comprehensive institutional system that supervises various activities to achieve organizational goals by increasing the effectiveness of strategy implementation [16]. Effective internal control enables companies to achieve their strategic goals through the standardization of business management, improvement of management efficiency and operation level, and reduction in risks encountered during production and operation [17]. Additionally, through the provision and communication of reliable data, it mitigates the risks related to information asymmetry, lowers the cost of debt [1], and enables managers to make scientific and objective decisions [18]. In 2008, the Chinese government established the Basic Code of Corporate Internal Control to improve internal control, strategy implementation efficiency, and performance in companies. Nonetheless, such cases continue to occur where insufficient internal control leads to financial failure and stock price declines.

In summary, CSR is an important corporate requirement to ensure that the economic system meets the public's expectations [19], and digital transformation has become a key strategy for companies to secure and maintain a competitive advantage [20]. Internal control that comprehensively supervises all corporate activities could enhance the effectiveness of a company's digital transformation and social responsibility performance. However, the existing literature has not studied the impact of the complex interaction of CSR, digital innovation, and internal controls on the firm value. Therefore, this study presents research models based on the stakeholder theory, resource-based perspective, and agent theory to analyze the interaction effect of social responsibility and digital transformation on firm value and the three-way interaction effect of internal control impacting the relationship between them.

2. Theoretical Background

2.1. Stakeholder Theory, Resource-Based View, and Agency Theory

This study presents a research model and hypotheses based on the stakeholder theory, resource-based perspective, and agency theory. The explanation of each theory and its relevance to this research topic are as follows.

Stakeholder Theory—Ansoff (1965) [21], who first proposed the concept of "stakeholders", believed that a company's comprehensive consideration of the needs of all stakeholders is crucial for establishing an optimal strategy. Subsequently, Freeman (1984) defined stakeholders as "groups and individuals who may affect the achievement of an organization's goals or be affected by the organization's achievement", and divided them into internal stakeholders—including executives and employees—and external stakeholders, including suppliers, shareholders, creditors, consumers, and governments [22].

The stakeholder theory argues that a company's goals must be flexible enough to shift from a traditional perspective that focuses solely on economic profits to one that considers the external environment of the company and the interests of social organizations. In other words, the key aspect of a company's development goal is achieving all stakeholder expectations and demands in a balanced manner for the company's long-term development. This is consistent with the corporate social responsibility, in that it insists on balancing economic and stakeholder interests to attain a level that maximizes the overall profit. Thus, the stakeholder theory has been a significant theoretical basis for CSR research and has helped to clarify the entities for which companies bear responsibility. Corporate managers are no longer merely shareholders' agents; they must also consider the rights and interests of all legitimate stakeholders and meet their requirements as much as possible [23].

Resource-based View—Penrose (1959), who first presented the theoretical basis for the resource-based view, argued that the growth and development of a company originates from, and is limited by, its heterogeneous resources [24]. Thus, the core concept of the resource-based view is the heterogeneous resources owned or controlled by a company—

some scholars refer to them as strategic resources [25]. Barney (1991) defined strategic resources as those with rare values and characteristics that are difficult to imitate and substitute [26]. Companies must strive to acquire strategic resources, and, to this end, they must form friendly and cooperative relationships with stakeholders [27]. They have to fulfill their responsibilities to shareholders, bondholders, governments, and other stakeholders to secure trust and obtain various resources and support from them. Strategic resources can assist in maintaining greater external capital, obtaining policy subsidies, and benefiting from tax incentives.

However, many studies have shown that even with the same resources, there are differences in the functions that help companies to gain a competitive advantage. To effectively allocate and utilize the available resources, there must be a certain level of quantity and variety of resources to generate value. Additionally, whether the deployment of these resources is reasonable and effective depends on the company's internal control function and this series of value creation processes corresponds to the resource management process [28].

Agency Theory—Agency theory was first proposed by Berle and Means (1932) [29]. Subsequently, Jensen and Meckling (1979) helped to raise awareness of the agency problem, which can arise from the characteristics of modern companies where ownership and management are separated [30]. Agency problems can arise because of information asymmetry between owners and managers. The managers who possess more information than the owners can make opportunistic decisions and take actions that conflict with the latter's interests. From this perspective, digital transformation, which can accelerate information transfer, increase information transparency, and reduce the degree of information asymmetry, can help to alleviate the agency problem [31]. Internal control also enables managers to improve firm value and can mitigate conflicts between owners and agents [32].

2.2. Corporate Social Responsibility

Bowen (1953) defined CSR from a moral perspective, stating that businessmen have the obligation to make decisions and act in accordance with social purposes and values [33]. Johnson (1973) further emphasized the broad scope of stakeholders and that corporations should be accountable to all parties, including shareholders, consumers, suppliers, sellers, government, and local communities [34]. Thus, a company's goals should not be limited to creating economic value for shareholders, but comprehensively reflect the requirements of all stakeholders by considering ethical factors and social evaluation.

A company can enhance its credibility and awareness by sharing CSR-related information with all parties in society, ultimately improving its image and reputation [35]. The honor and credit accumulated by performing social responsibilities prevent damage to firm value during crisis [36]. CSR helps companies to accumulate capital by receiving greater attention in the capital markets and to receive greater support from governments and society [37,38].

2.3. Digital Transformation

Digital transformation refers to a process through which companies leverage the latest digital technologies (e.g., social media, mobile technology, analysis, or embedded devices) to improve existing management models, build new organizational structures and operating systems to improve business performance, and pursue continuous competitive advantages [39,40]. Digital transformation improves resource allocation and reduces the impact of external uncertainty on businesses through efficient data streams [41].

Researchers have studied the impact of digital transformation on production efficiency and innovation and performance. In terms of a company's production efficiency, digital transformation can reduce external transaction costs, improve the level of specialization and production efficiency, and accelerate growth [42]. Additionally, it can mitigate the financing challenges experienced by companies, improve internal control, and enhance labor productivity by optimizing the human capital structure. Studies on the relationship

between digital transformation and innovation have also argued that digital transformation raises investor awareness of companies, increases the acceptance of innovation costs, raises risk levels, and promotes corporate innovation [16].

However, conflicting claims have been made about the impact of digital transformation on corporate performance. Chen and Zhang (2024) argued that digital transformation improves the firm value of manufacturing companies [43], whereas Guo and Xu (2021) argued that digital transformation negatively impacts companies' short-term financial performance [7]. Sousa-Zomer, Neely, and Martinez (2020) argued that only certain digitally transformed companies improved their performance [44].

3. Research Hypotheses

3.1. Relationship between CSR and Firm Value

Some researchers have argued that CSR is not beneficial for improving a company's firm value, because it consumes capital and human resources, which could be utilized for productive activities, such as technological innovation [45]. However, recent studies have suggested that companies can not only reduce risk by performing social responsibility [36,46], but may also gain social prestige and improve relationships with external stakeholders [47].

CSR as a strategy combines economic and social goals and promotes long-term development to meet stakeholders' needs [48]. According to the stakeholder theory, companies can form friendly relations with stakeholders through CSR and secure resources to obtain a competitive advantage [49]. CSR is a driving force behind corporate development and improves corporate profits by reducing employee departures, improving work enthusiasm and loyalty, increasing productivity, and reducing the cost of hiring and training new employees [50]. In addition, CSR promotes the intention to purchase products by obtaining consumers' trust and favor and ensures a stable supply of raw materials by building cooperative relationships with suppliers [51]. Furthermore, companies that voluntarily fulfill their social responsibilities can receive more policy benefits from the government and other organizations, thereby increasing the company's public trust and receiving more diverse support.

From a resource-based perspective, the social capital that companies accumulate via CSR activities can be an intangible resource that is difficult to imitate [52,53]. This reduces unnecessary costs and financial risks, improves the image of the company among potential buyers, increases profits, and has a positive impact on the firm value. Therefore, the following hypothesis is proposed.

Hypothesis 1. *CSR has a positive (+) effect on the firm value.*

3.2. Moderating Effect of Digital Transformation

Recently, digital transformation has emerged as a significant strategy for business and national economic growth [54,55]. Consequently, the Chinese government has established a series of methods to promote it. According to the 2020 Notification on the Accelerating Digital Transformation of Public Enterprises, the digital economy has been set as a major direction for future economic development. Additionally, digital transformation has been emphasized as a key driving force for promoting the high-quality development of companies.

Digital transformation refers to the application of various new technologies, such as big data, cloud computing, and artificial intelligence, to a company's production and management processes [56]. This increases the availability of information by processing internal and external data using digital technology [57], and it enables companies to efficiently acquire, share, and analyze information [58]. Digital transformation can mitigate information asymmetry, rapidly meet the needs of various stakeholders, secure a high level of social reputation and industrial status [31], and acquire resources that cannot be replicated [10]. Additionally, it can facilitate investment by sending positive external sig-

nals [59], increasing productivity, and lowering costs via the automation of corporate operational processes [60].

Securing and promoting corporate sustainability through digital transformation is a key issue for members of society, policymakers, and businesses [61]. According to Ionaşcu, Ionaşcu, Nechita, Săcărin, and Minu (2022), digital transformation can help companies to better perform their social responsibilities [62]. Managers who have to pursue maximum benefits at minimal cost are likely to deliberately lower the quality of information disclosure and selectively provide social responsibility-related information to the public [63]. Big data and blockchain technologies help to effectively address the problems caused by information asymmetry by increasing recordability and traceability, which improves the public supervision of companies and encourages them to perform their social responsibilities practically and effectively.

In addition, digital transformation improves a company's ability to acquire and integrate resources, reduces operating costs associated with these activities, closely aligns with CSR needs, and increases the company's profits and investment returns [64,65].

Hypothesis 2. *Digital transformation strengthens the positive relationship between CSR and the firm value.*

3.3. Three-Way Interaction Effect of Internal Control

According to the 2013 definition of the Committee of Sponsoring Institutions (COSO), which develops guidelines for assessing the level of internal control and risk management, the goal of internal control is to ensure the efficiency of business operations, the legitimacy of management, and the reliability of financial reporting [66]. Previous studies have argued that effective internal control can reduce the cost and risk of a company. They argued that it is possible to increase the execution efficiency of strategies and promote stable and sustainable corporate development by reducing moral risks and opportunistic behaviors, such as the adverse selection of managers [67–71].

The Guidelines for Applying Internal Control No. 4—Social Responsibility released by China's Ministry of Finance requires that companies faithfully fulfill their social responsibilities and obligations in the management process of companies. In addition, they suggest safety production, product quality (service), environmental protection, resource conservation, employment promotion, and employee rights' protection as the goals of internal control. The guidelines increase the practical value of CSR activities through effective internal control. In practice, a good internal control system is known to significantly reduce the risks that companies may experience in the process of performing their social responsibilities by raising risk awareness and improving management [68].

In addition, companies promoting digital transformation may face significant risks owing to various challenges and uncertainties caused by instability in the digital environment. In this process, as a governance system to consider the relationship of stakeholders in a balanced way, the internal control system can reduce the uncertainty and risks caused by business activities and help to promote digital transformation [72].

Taken together, a company's internal control system can strengthen and effectively execute corporate responsibility to its stakeholders. It can promote the performance of social responsibility through digital transformation. Therefore, we propose the following hypothesis.

Hypothesis 3. *The moderating effect of digital transformation on the positive relationship between CSR and the firm value is stronger in companies with high internal control.*

Figure 1 presents the research model, which schematically expresses the relationship between the variables in the hypothesis.

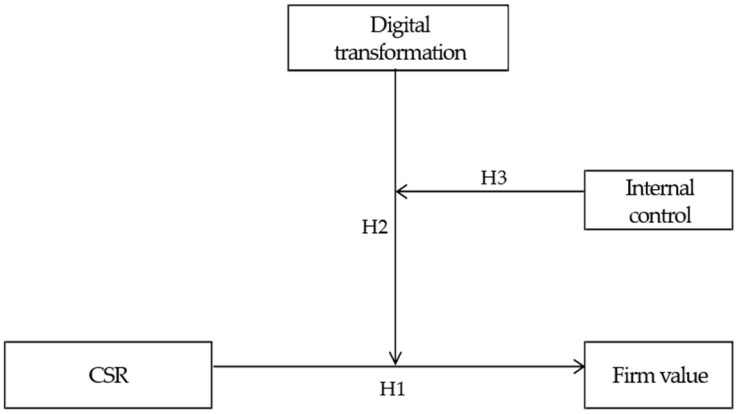

Figure 1. Research model.

4. Data and Measures

4.1. Data

For the empirical analysis of the research model and hypotheses, data on companies listed on the Chinese A-share market from 2019 to 2020 were collected from the China Stock Market & Accounting (CSMAR) (國泰安), HEXUN (和訊), and DIB databases. First, data regarding a company's value (Tobin's Q), digital transformation word frequency, age, size, fixed asset ratio, and debt ratio were collected from the CSMAR (國泰安) database. Next, CSR rating information was collected from the HEXUN (和訊) database, and the internal control index was collected from the DIB database. The firm value data of companies listed on the Chinese A-share market were collected from 2020 to 2021, and a 1-year time lag was set to consider the temporal difference in the impact of independent variables on dependent variables. After excluding companies with missing information in the data collection process, this study selected 1904 samples (N = 1904).

4.2. Measures

4.2.1. Dependent Variable: Tobin's Q

Using Tobin's Q as a measure of the firm value, we seek to estimate the market's valuation for the complementary interaction effects of CSR, DT, and the corporate governance system. Tobin's Q is a variable representing the enterprise value evaluated by the market, not just the operating performance of the company [73]. Our method is analogous to Alexander and Buchholz (1978) and Subin and Yuan (2008), who analyzed the impact of CSR on the firm value [73,74]. Tobin's Q was measured by the ratio of market value (market capitalization of common stock + book value of liabilities) to the book value of total assets.

4.2.2. Independent Variable: CSR

To measure social responsibility, we employed the CSR evaluation data from HEXUN—a Chinese third-party CSR evaluation agency. In HEXUN's CSR evaluation system, CSR is classified into five areas: shareholder responsibility, employee responsibility, supplier and consumer rights responsibility, environmental responsibility, and social responsibility. Each area was evaluated by assigning weights and then adding them up arithmetically. This study used a final CSR score that is announced out of 100.

4.2.3. Moderating Variables: Digital Transformation and Internal Control

The first moderating variable, digital transformation, was measured by the frequency of text words related to digitalization in the annual report of listed companies [75,76]. The China Digital Economy Research Database of China Stock Market and Accounting Research (CSMAR) defines the digital transformation in five dimensions: artificial intelligence technology, blockchain technology, cloud computing technology, big data technol-

ogy, and digital technology application. In this study, we summed the word frequencies of these five dimensions to measure the digital transformation of listed companies [77]. However, data measured in this way are prone to a typical "right-biased" issue. To address this, the level of a company's digital transformation was calculated by adding 1 to the total number of relevant keywords and then taking the natural logarithm [78]. Table 1 presents the dimensions and words related to digitalization used in this study.

Table 1. Text words related to digitalization [77].

Dimensions of Digitalization	Corresponding Text Word
Artificial intelligence technology	Machine learning, artificial intelligence, face recognition, business intelligence, identity verification, deep learning, biometrics, image understanding, semantic search, voice recognition, intelligent robotics, intelligent data analysis, autonomous driving, natural voice processing
Blockchain technology	Bitcoin, distributed computing, consensus mechanism, federated chain, decentralization.
Cloud computing technology	EB-level storage, multi-party secure computing, brain-like computing, stream computing, green computing, in-memory computing, cognitive computing, converged architecture, graph computing, Internet of Things, information physical systems, billion concurrency, cloud computing
Big data technology	Mixed reality, data visualization, data mining, text mining, virtual reality, heterogeneous data, augmented reality, credit investigation
Digital technology applications	B2B, B2C, C2B, C2C, fintech, NFC payment, 020, third-party payment, e-commerce, industrial Internet, Internet finance, Internet healthcare, fintech, open banking, quantitative finance, digital finance, digital marketing, netlink, unstaffed retail, mobile Internet, mobile payment, smart agriculture, smart wear, smart grid, smart environmental protection, smart home, smart transportation, smart customer service, smart energy, smart investment, smart cultural travel, smart medical, smart marketing

The second moderating variable, internal control, was measured using the internal control index released by DIB—a Chinese corporate risk management technology company—as a substitute. DIB is the first independent third-party organization in China to publish internal control indicators for listed companies. The DIB database is an internal control information disclosure indicator system developed by DIB considering the actual situation in China based on the Internal Control Integration Framework published by the US COSO and the government of China's Basic Standards for Internal Control. The DIB internal control index is based on the degree of achievement of five goals, including internal control strategy, management, reporting, compliance, and asset safety. Specifically, the five objectives of internal control are divided into basic levels (legal compliance indicators, asset safety indicators, and reliable reporting indicators); management levels (management efficiency and effectiveness improvement indicators); and strategy levels (realization of corporate development strategy indicators). Thereafter, the overall index is obtained using weighted linear regression. The score ranges from 0 to 1000, and the larger the internal control index, the higher the level of internal control. Recently, this index has been widely used in academia and practice, accurately and objectively reflecting the level of internal control of listed companies in China. Therefore, this study referred to previous studies [79] and measured the value calculated by dividing the "internal control index" of listed companies issued by DIB by 100 as an internal control variable.

$$\text{Internal Control Index} = \Sigma\text{Basic Level} + \Sigma\text{Operation Level} + \Sigma\ \text{Strategy Level}$$

The control variables were the firm size, firm age, debt ratio, and fixed asset ratio.

The firm size can significantly impact the firm value, because it is related to a firm's resources, competitive response capabilities, and financing capabilities [80,81]. Therefore, this study controlled the effect of company size measured by the natural logarithm of total assets [82].

The firm age can also significantly impact the firm value [83]. Startups have innovative and flexible organizational cultures that make it easy to accept and implement new ideas. On the other hand, old companies can have a great resistance to change due to bureaucracy and a rigid organizational culture. Therefore, we controlled the effect of firm age, measured by subtracting the standard year from the establishment year. The debt-to-equity ratio, measured as the ratio of a firm's total debt to its total assets, indicates financial risk; the higher the debt-to-equity ratio, the higher the firm's financial risk [84]. A reasonable debt level can reduce agency problems and improve corporate performance between management and shareholders. Conversely, an inordinate debt ratio could adversely impact the corporate competitiveness and firm value.

Additionally, the ratio of fixed assets, which represents the ratio of fixed assets to total assets, could increase a firm's financial leverage and its financial risk. Therefore, this study controlled the effects of the debt and fixed asset ratios [85].

5. Analysis and Results

A hierarchical multiple regression analysis was performed to empirically analyze the research model and hypotheses. Hierarchical multiple regression is a type of regression model in which the predictors are entered in blocks. Each block represents one step. The order to enter predictors into the model is decided by the researcher, but should always be based on theory. Thus, hierarchical multiple regression is the most appropriate analysis method to verify the empirical model of this study, which aims to analyze the effect of digital transformation that strengthens the effect of CSR on the firm value and the effect of internal control that strengthens the relationship between them step by step.

Descriptive statistics of major variables and Pearson's correlation between variables are presented in Table 2. Table 3 presents the results of the hierarchical multiple regression analysis. First, according to the analysis results of Model 1, which analyzed the relationship between the control and dependent variables, the firm age ($\beta = -0.192$, $p < 0.001$), firm size ($\beta = -0.305$, $p < 0.001$), fixed asset ratio ($\beta = -0.133$, $p < 0.001$), and debt ratio ($\beta = -0.333$, $p < 0.001$) had a significant negative impact on the dependent variable, the firm value. Among them, the negative impact of company size on the firm value is the exact opposite of the prediction that the larger the company size, the more it can realize economies of scale in production and operation, thereby improving profitability [86]. In large companies, the organizational structures can be complex and bureaucratic, which can reduce the efficiency of decision-making. We infer that this may have a negative impact on the firm value, contrary to expectations.

Model 2 analyzed the effect of the independent variable, CSR, on financial performance. We find support for hypothesis 1, which predicts a positive relationship between CSR and financial performance ($\beta = 0.202$, $p < 0.001$). Model 3 analyzed the moderating impact of digital transformation on the relationship between CSR and financial performance. According to the results, digital transformation strengthened the positive relationship between CSR and financial performance ($\beta = 0.110$, $p < 0.05$). Thus, hypothesis 2 was supported. Model 4 analyzed the three-way interaction effects of CSR, digital transformation, and internal controls. The analysis revealed that internal control once again strengthened the moderating effect of digital transformation by strengthening the positive relationship between CSR and financial performance ($\beta = 0.816$, $p < 0.01$). Thus, hypothesis 3 was supported.

Table 2. Descriptive statistics and Pearson correlations.

	Mean	SD	1	2	3	4	5	6	7	8
Firm value	1.83	0.64	1							
CSR	1.80	0.85	0.210 **	1						
Digital transformation	8.35	19.37	−0.038	−0.011	1					
Internal control	6.34	1.21	0.031	0.311 **	0.072 **	1				
Firm age	12.14	7.46	−0.420 **	0.009	−0.010	0.020	1			
Firm size	22.46	1.28	−0.564 **	0.162 **	0.151 **	0.156 **	0.466 **	1		
Fixed asset ratio	0.24	0.14	−0.206 **	−0.041	−0.232 **	−0.027	0.109 **	0.125 **	1	
Debt ratio	0.45	0.17	−0.521 **	−0.272 **	0.069 **	−0.042	0.216 **	0.463 **	0.043	1

** $p < 0.01$

Table 3. Hierarchical multiple regression analysis results.

	Model 1	Model 2	Model 3	Model 4
N = 1904	β(t)	β(t)	β(t)	β(t)
Dependent variable		Firm value		
Firm age	−0.192 *** (−9.971)	−0.173 *** (−9.251)	−0.174 *** (−9.285)	−0.169 *** (−8.989)
Firm size	−0.305 *** (−14.369)	−0.389 *** (−17.738)	−0.392 *** (−17.561)	−0.410 *** (−18.006)
Fixed asset ratio	−0.133 *** (−7.739)	−0.120 *** (−7.189)	−0.117 *** (−6.792)	−0.112 *** (−6.502)
Debt ratio	−0.333 *** (−17.371)	−0.243 *** (−12.014)	−0.246 *** (−12.137)	−0.243 *** (−12.007)
CSR		0.202 *** (11.050)	0.151 *** (5.583)	0.283 * (2.249)
Digital transformation			−0.076 * (−1.988)	0.264 (1.300)
CSR×Digital transformation			0.110 * (2.570)	−0.670 ** (−2.610)
Internal control				0.034 (0.636)
CSR × Internal control				−0.140 (−0.954)
Digital transformation × Internal control				−0.354 (−1.583)
CSR × Digital transformation × Internal control				0.816 ** (2.936)
R2	0.453	0.486	0.488	0.493
Adj R2	0.452	0.485	0.486	0.490
F value	393.086 ***	358.941 ***	258.079 ***	167.180 ***

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Figure 2 schematically illustrates the effect of the interaction between CSR and digital transformation on the firm value. CSR had different effects on the firm value, depending on the degree of digital transformation. Specifically, the impact of CSR on the firm value was higher in companies with higher degrees of digital transformation than in companies with lower degrees of digital transformation. This result implies that companies with both CSR and digital transformation at a high level generated a higher firm value than companies with only one factor at a high level, or both factors at a low level.

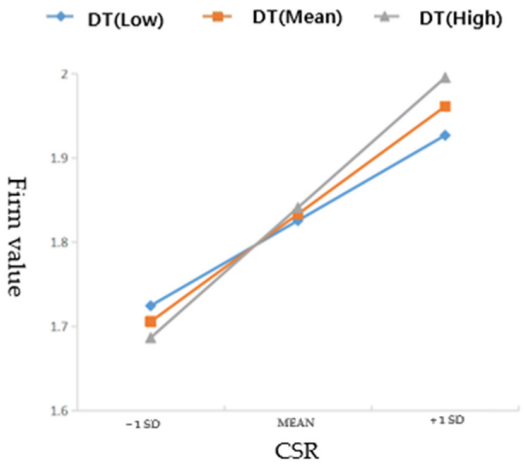

Figure 2. Interaction between digital transformation and CSR.

The difference in the moderating effect of digital transformation on the relationship between CSR and the firm value according to the level of internal control was analyzed using a bootstrap confidence interval test analysis. According to the findings, when the level of internal control was low, the positive effect of CSR on the firm value amid low digital transformation was greater than that amid high digital transformation. However, when internal control was high, CSR had a high positive effect on the firm value in higher digital transformation. This finding shows that companies implementing high levels of CSR, digital transformation, and internal control together generated a better firm value than those that did not (Figure 3).

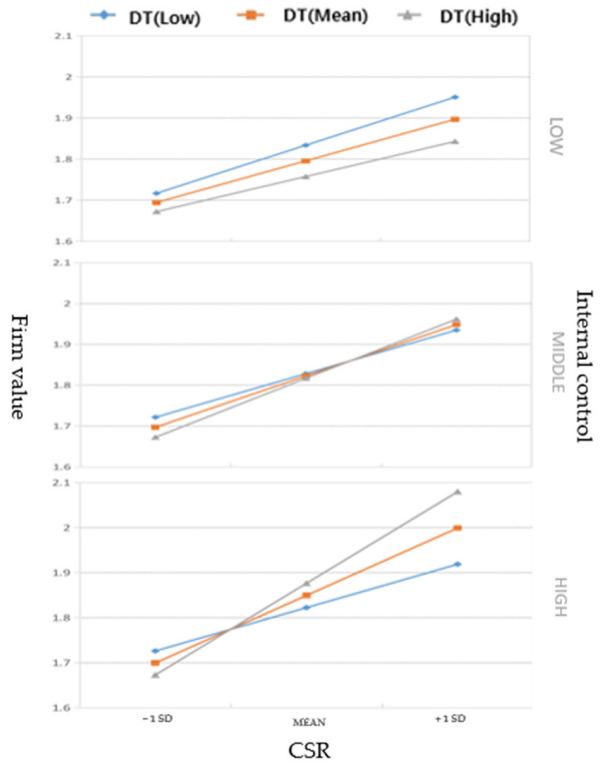

Figure 3. Interactions between internal controls, digital transformation, and CSR.

6. Conclusions

6.1. Key Findings

The key findings of this study are as follows. First, Hypothesis 1 was supported as it was found that CSR had a positive effect on the firm value. Second, Hypothesis 2 was supported as digital transformation was shown to strengthen the positive relationship between CSR and the firm value. Third, Hypothesis 3 was supported as internal control was shown to strengthen the interaction effect of CSR and DT on the firm value. Taken together, it empirically shows that CSR, DT, and internal control work complementarily to have a positive effect on the firm value. When all three factors are high, there is a synergy effect that maximizes the effect.

6.2. Discussion

First, the CSR activities of Chinese companies had a positive impact on their firm value. Previous studies on the impact of CSR activities on the firm value have yielded inconsistent results. Studies that regarded maximizing shareholder profits as the paramount and sole goal of a company, based on Friedman's (1970) claim [87], have argued that CSR activities do not improve the firm value [45]. Moreover, some studies have suggested that CSR activities could adversely impact the firm value by consuming the company's limited resources [88]. However, recent studies have increasingly recognized CSR as an opportunity and strategy to improve corporate competitiveness and performance because of changes in stakeholders' perceptions of CSR and sustainability as well as shifts in government policies [46,48,89]. From this perspective, our results are consistent with those of previous studies [90–92], which argued that CSR activities could have a positive impact on the firm value. This suggests that the CSR of Chinese companies is becoming a strategic factor for improving performance by providing opportunities to secure a competitive advantage.

Second, digital transformation strengthens the positive relationship between CSR and the firm value of Chinese companies. As government policies to promote the digital transformation of public companies have been announced, many studies have analyzed the direct impact of digital transformation on the firm value. However, empirical analysis of the interaction effect between digital transformation and CSR remains scarce [61]. Thus, this study empirically analyzed the interaction effects of digital transformation and CSR to overcome these research gaps. The results revealed that companies that simultaneously implement digital transformation and CSR strategies can improve performance. Such findings provide valuable information to companies as well as to policymakers, regulators, and investors. Recently, companies have been experiencing an increasing need to perform more CSR activities owing to changes in stakeholders' perceptions and technological and policy environments, while simultaneously implementing digital transformation using various technologies. However, the efficient allocation of limited resources to corporate strategies is challenging for managers. From this perspective, the results of this study provide managers with useful information regarding the complementary implementation of digital transformation and CSR. Companies needing to demonstrate greater social responsibility amid fierce competition should not focus solely on economic responsibility, but should also promote sustainable and harmonious development with various internal and external stakeholders through digital transformation and CSR synergy.

Third, the analysis of the three-way interaction effect of CSR, digital transformation, and internal control reveals that internal control further strengthens the moderating effect of digital transformation, strengthening the positive relationship between CSR and the firm value. This finding implies that internal control of Chinese companies helps to protect stakeholders' rights and interests, promotes sustainability, and performs key strategic functions to mitigate potential risks and uncertainties associated with digital transformation [71]. Therefore, the Chinese government, which is currently transitioning from a quantitative to a qualitative growth-oriented economic strategy, should promote a policy to build the internal control systems of companies. Additionally, the finding promotes re-

search on the complex interaction effects among various strategic factors that can influence economic benefits and sustainable development within companies.

6.3. Implications

The theoretical implications of this study are as follows. Many scholars have argued that CSR and the firm value can be improved at the same time. They have also argued that effective internal control has positive relationships with corporate social responsibility, DT, and the firm value, respectively [93]. However, they overlooked the possibility of creating synergies between CSR and DT. They failed to provide research models and empirical results for how the complementary effects (synergy) of CSR, digital transformation, and internal control can affect the firm value. This study contributed to overcoming this limitation by proposing and analyzing an research model applying the time gap between independent and moderating variables (CSR, DT, and internal control) and a dependent variable (Tobin's Q).

In addition, this study presents practical implications for a strategy to promote the growth and development of a company by linking the management system with the social system. According to the analysis results of this study, companies can build and implement CSR, digital transformation, and internal control systems from an integrated perspective to improve the firm value and strengthen sustainability. Since these elements complement each other and create synergies, companies need to strategically link and operate them.

6.4. Limitations and Future Studies

Thes implications need to be considered along with the following limitations, which may suggest the need for future research. First of all, in this study, we adopted the total CSR score provided by the HEXUN database to measure the level of social responsibility of listed companies in China. However, the HEXUN database does not disclose the evaluation results of detailed items divided into shareholder responsibility, employee responsibility, supplier and consumer rights responsibility, environmental responsibility, and social responsibility. Therefore, this study did not provide information on discriminatory effects on CSR sub-areas that improve performance using DT. If a future study is conducted to analyze and present the interaction effect between each sub-area of CSR and DT on the firm value, this can help to overcome these limitations.

Second, this study employed a text analysis method, which has been used in most related studies [76,77], to measure the degree of digital transformation of Chinese listed companies. Text analysis effectively measures the extent of a company's digital transformation using publicly disclosed text information. However, it lacks unified standards and measurement methods based on a defined set of keywords and an established standard dictionary. Moreover, if a company overly emphasizes its level of digital transformation in its annual reports, this method might not objectively measure the exact extent of its digital transformation [94]. Therefore, it is necessary to enhance the objectivity of the analysis results by conducting additional follow-up studies that measure and analyze survey methods [95] or digital project investments as proxy variables.

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