Institutional Ownership and Financing Constraints: Moderating Effect of Digital Finance

Boxin Deng
School of Management, Universiti Sains Malaysia,11800 USM, Penang, Malaysia
Email: dengboxin@student.usm.my

Char-Lee Lok
School of Management, Universiti Sains Malaysia,11800 USM, Penang, Malaysia
Corresponding Author Email: lokcl@usm.my

Abstract
This study takes A-share listed firms in Shanghai and Shenzhen Stock exchanges from 2011 to 2020 as research samples and aims to analyze the impact of institutional ownership on the financing constraints of Chinese firms under the regulation of digital finance. It obtains 20,370 firm-year observations and is analyzed by fixed effect regression. The result indicates a significant negative correlation between institutional ownership and financing constraints, thereby supporting the resource-based view theory. In addition, this study also reveals that institutional ownership has a greater negative impact on financing constraints when firms are located in provinces with higher levels of digital finance. These findings highlight the potential of digital finance to solve the financing constraints of Chinese firms and the importance of institutional regulation and guidance by the Chinese government.
Keywords: Financing Constraints, Institutional Ownership, Digital Finance, Resource-Based View Theory, Institution-Based View Theory

Introduction
Financing constraints refer to financial barriers that prevent enterprises from accessing external funds, resulting in limited funding for investment activities (Fazzari et al., 1988; Harrison et al., 2004; Ismail et al., 2010; Kaplan & Zingales, 1997). Access to finance is a primary business challenge for 22.4% of Chinese firms Li et al (2023), and 75% of listed nonfinancial firms view financing constraints as the primary impediment to investment and growth (Cao et al., 2020). The State Council issued a Circular on Policy Measures for Stabilizing the Economy Package in 2022 to address financing issues and promote healthy development for enterprises (Guo, 2023).
Formal financing channels in China often suffer from underdevelopment and insufficiency (Wu et al., 2016), leading to limited scarce resources (Du et al., 2015). Due to the inefficient allocation of credit resources Zhang (2022), most firms rely on informal financing sources like political or professional connections and trade credit (Ge & Qiu, 2007). Chinese firms leverage

informal institutions like guanxi Park & Luo (2001) and bribery (Cai et al., 2011; Wan et al., (2022) to gain legitimacy and resources from powerful external stakeholders DiMaggio & Powell, 1983; Meyer & Rowan, 1977), addressing institutional deficiencies in Chinese financial markets, causing difficulties in formal financing (Cai et al., 2022).

Financing constraints have become a significant barrier to the expansion of Chinese firms (Wang et al., 2022). Financing constraints significantly impact corporate value in incomplete markets, affecting the overall market landscape (Cai et al., 2022). They have long been a challenge for nations worldwide like China Lou et al (2024); Yang et al (2014), affecting firm productivity Wong et al (2023), foreign direct investment Sasidharan & Padmaja (2018), exports Padmaja & Sasidharan 2(021), and group affiliation performance (Bhatia & Chakrabarti, 2022). Effective financing is crucial for Chinese enterprise development and directly influences enterprise innovation (Wei et al., 2022). Financing constraints significantly influence risk in the financial system and the real economy (Wei et al., 2022), with risk levels increasing as financing constraints intensify (Nguyen & Nguyen, 2020).

China's financial markets have not done a good job of allocating resources and reducing financial pressures (Allen et al., 2012). Local governments control financial resource allocation, leading to ownership discrimination (Zheng & Ye, 2013). With its rapid economic growth and manufacturing sector Hussin & Yik (2012), China's less developed laws and institutions result in an inefficient financial sector (Allen et al., 2005; Zhang et al., 2012). Due to the late development of the capital market and credit discrimination (Chen et al., 2024; Ge & Qiu, 2007), financing constraints have become a hindrance to China's rapid economic development (Yu et al., 2021). Financing constraints have become an important issue of concern to government departments in China (Xiao, 2023). China's underdeveloped bank-based financial system, controlled by the government Yazar (2015), makes firms heavily rely on internal financing and lack funding. The Chinese economy urgently needs to address improving access to quality financial services and easing financial restraints on firms (Liu et al., 2021).

While the government controls the financial system, China's capital market allows shareholders to freely pledge shares (Shi et al., 2023). Institutional ownership in China includes financial institutions like investment banking, insurance, pension funding, and mutual funds (Chi et al., 2019). Institutional investors possess advanced resources Eaton et al (2014), management skills, and professional knowledge (Menkhoff et al., 2010). They also provide funding resources García-Meca et al (2017) and help secure expansion financing for listed companies (Velte, 2024). In the past two decades, China has experienced rapid growth in institutional investors (Chi et al., 2019). Institutional investors invest in and participate in numerous firms, learning from successful ones, acquiring valuable experience resources, and accessing scarce information resources in relevant markets (Chen et al., 2014). As shareholders, institutional investors possess the motivation and capacity to offer valuable resources such as relevant information, knowledge, and experience to the enterprise (Chen et al., 2014; Foss et al., 2021; Panicker et al., 2022).

The integration of the financial sector and information technology has been deepening. in recent years (Awan, Shamim, et al., 2021; Awan et al., 2021; Zhang et al., 2024). Digital finance, or FinTech, leverages technologies like artificial intelligence (AI), big data, cloud computing, and blockchain, effectively reduces transaction costs and provides a wider range of financial services (Bisht et al., 2022; Goldstein et al., 2019; Ozili, 2018; Zhan et al., 2023). It has led to a decentralization of the traditional financial industry, with financial information now distributed and networked (Chen & Bellavitis, 2020). Digital finance, utilizing advanced

technology, can often accurately assess the relevance of a situation and conduct scientific risk assessments (Lee & Shin, 2018). It enhances credit accessibility, information access, and social trust acceptance (Chang et al., 2023; Yu et al., 2020). Digital finance enhances efficiency, facilitates financial transactions, and reduces information asymmetry (Chang et al., 2023). It expands traditional financial services, reducing market thresholds and transaction costs, ultimately improving financial resource efficiency (Gomber et al., 2018), and helps firms improve their operations (Beck et al., 2018). The China credit ratio problem has accelerated the growth of digital finance, with the country holding a significant share of the global market (Gruin & Knaack, 2020). In 2019, the People's Bank of China emphasized the importance of utilizing digital finance to optimize the credit process, reduce financing costs, and improve financial system functionality (Huang et al., 2023).

However, China's 31 provinces exhibit significant resource inequalities (Wang, Phua, et al., 2023), and the level of leverage of Chinese firms fluctuates based on the level of development in various areas (Huang & Song, 2006). Scholars have found the financial industry development in various regions of China is uneven and significantly different (Wang et al., 2023; Zhang et al., 2015). While the financial efficiency and development level of the eastern region is relatively high (Jiang et al., 2019), the development of green finance in the provinces of the region shows different degrees of inequality (Lv et al., 2021). There are also regional differences in the degree of financial development in coastal provinces (Guo et al., 2020). The ratio of labor efficiencies to digital finance in eastern regions increased from 21% in 2011 to 82% in 2017, while non-eastern regions saw a double-digit increase to 42% (Wang et al., 2023). In 2017, the realization rate of the potential efficiency value of digital finance in the eastern region is 95%, compared to only 71% in the non-eastern region (Wang et al., 2023). These differences in the institutional environment will also have a great influence on the financing of Chinese firms (Wang, Lok, et al., 2023; Zhang et al., 2016).

China has seen rapid development of digital finance due to its strategic development goals (Zhan et al., 2023). Digital finance revolutionizes traditional financial systems by improving capital allocation efficiency and significantly impacting the traditional financial structure (Zhan et al., 2023). China's digital economy has led to price and allocation distortions in its financial factor market, with regional financial development levels causing severe financing constraints in some regions (Hui et al., 2023).

The economic development gap between eastern China and other regions remains significant (Zhang et al., 2021). This makes China an important reference for studying the regional differences between digital finance and traditional finance (Wang et al., 2023)

The paper aims to make three significances to the existing literature. Firstly, the study illustrates the theoretical mechanism that explains higher institutional ownership leads to lower financing constraints. Secondly, as an emerging financial model, scholars have paid more emphasis on the way digital finance affects the overall economy, while relatively little research has been done at the firm level. However, the literature on firm-level studies primarily focuses on the relationship between digital finance and firm performance like innovation and productivity. Less attention has been paid to the impact on financing constraints, and few scholars have considered its indirect correlation, especially the moderating effects of digital finance in China. The study underscores the significance of institutional characteristics in facilitating balanced capital allocation and growth in developing nations through financial development. Therefore, the study of interregional financing constraints has received limited attention. Thirdly, it offers additional theoretical

explanations regarding the moderating effect of digital finance on the correlation between institutional ownership and financing constraints.

The paper is motivated to investigate this specific research question for the following reasons. Firstly, motivated by Farooq et al. (2022) who conclude that financing constraints in Pakistan are significantly influenced by institutional ownership, the paper aims to investigate the relationship in China. Secondly, motivated by Chatterjee et al. (2023), who suggest that institutional ownership significantly lower debt costs for firms, particularly in environments with lower marketization and low credit quality, the research aims to expand existing empirical research on the financing gap for enterprises in developing financial systems like China. Thirdly, motivated by Li et al (2023) and others, who document the influence of regional digital finance advancements on the financing challenges faced by firms, this paper aims to find whether digital finance can correct traditional finance discrimination, improve external financing capabilities, and easing firm financing constraints of Chinese firms.

Although existing studies have examined the relationship between ownership structure and financing constraints, there is little research on institutional ownership of Chinese firms. With the above issues in mind, the objectives of this study are:
• To examine the impact of institutional ownership on financing constraints of Chinese firms.
• To examine the role of digital finance in moderating the relationship between institutional ownership and financing constraints of Chinese firms.

Literature Review and Hypotheses
Resource-Based View Theory

The resource-based view (RBV) theory proposes that firms obtain an edge over rivals by effectively managing and accumulating strategic resources (Barney, 1991). Firms are not just units but collections of resources, and they can maintain competitive advantages by utilizing valuable resources and capabilities (Barney, 2001). Resources are the productive assets of firms (Abu Bakar & Ahmad, 2010), including knowledge, physical assets, human capital, and other factors, for efficient conversion into end products or services (Amit & Schoemaker, 1993; Capron & Hulland, 1999). Despite limited resources, some firms are unique and well-positioned to create valuable products and generate wealth (Day & Wensley, 1988).

Firms possess a diverse range of resources (Barney, 1991), including intangible resources, tangible resources (Penrose, 2009), strategic resources (Day & Wensley, 1988), assets (Barney, 1991), and capabilities (Day, 1994). Valuable intangible resources such as expertise, skills, reputation, and entrepreneurial orientation (Tehseen & Sajilan, 2016) are crucial, while tangible resources like capital, access to capital and location (Runyan et al., 2006) or technological assets (Barney, 1991) are essential. Organizational capability refers to the ability and expertise to handle both intangible and tangible resources (Day, 1994). To achieve a sustainable competitive advantage and high performance, firms must transform their resources into capabilities (Mahoney & Pandian, 1992). Barney & Hesterly (2019) propose four primary resource categories: physical, financial, human, and organizational. A firm can achieve superior performance not only due to better resources but also due to better resource utilization (Kozlenkova et al., 2014; Penrose, 2009).

Nexus Between Institutional Ownership and Financing Constraints

Agency theory argues that institutional investors play a crucial role in corporate governance, enhancing manager supervision and ensuring shareholder prosperity (Schmidt & Fahlenbrach, 2017). They minimize agency conflict, monitor management information

quality, promote stronger governance, and reduce shareholder-manager conflicts (Chung et al., 2002; Jensen & Meckling, 1976). Institutional investors have the expertise to manage portfolio companies effectively (Shleifer & Vishny, 1986). By modifying governance structures (Lin et al., 2011), strengthening external oversight, and requiring increased corporate disclosure (Bird & Karolyi, 2016), institutional investors may lower borrowing costs and reduce financing constraints (Goergen & Renneboog, 2001).

The study is based on the resource-based view theory, which suggests firms should focus on accumulating, utilizing, and reconfiguring their resources internally to differentiate and enhance competitiveness in the market (Wernerfelt, 1984). The resource endowment of a company is linked to its ownership types (Fernández & Nieto, 2005). The RBV theory can be applied to alliance partnerships, enabling firms to gain competitive advantage through ownership and control of resources (De La O & Matis, 2014), reducing risk and costs, and enabling better financing (Chen et al., 2014). The literature predominantly focuses on the "smart money" of institutional investors (Borochin & Yang, 2017), contrasting with the less sophisticated individual "retail" investors due to limited search resources (Barber & Odean, 2008). Institutional ownership provides firms with valuable resources like information, managerial capabilities, and financial capital (Fernández & Nieto, 2006; George et al., 2005), enhancing their competitive advantages and enabling access to financing (Chen et al., 2021). With their financial expertise (Farooq et al., 2022), institutional investors play a crucial role in reducing information asymmetry in the credit market and enhancing access to finance (Schain & Stiebale, 2021). Firms with higher institutional ownership tend to have fewer financing constraints (Lin et al., 2011). The proposed hypothesis is as follows:

Hypothesis 1 (H1): Institutional ownership negatively impacts the financing constraints of Chinses firms.

Institution-Based View Theory

Institutionalism in social sciences focuses on institutions' importance (Peng et al., 2009), overcoming industry-based and resource-based views' lack of context-specific focus (Peng, 2002), resulting in the establishment of the institution-based view (IBV) theory (Peng et al., 2008; Peng & Heath, 1996). Research identifies formal and informal institutions, which are different but complementary sides of the coin (North, 1990; Peng et al., 2009). Formal institutions, encompassing laws, rules, and regulations, and informal institutions, encompassing culture, norms, and values, offer a comprehensive view of the institutional environment (Garrido et al., 2014).

The IBV reveals the underlying forces of differences in firm performance (Garrido et al., 2014). Institutions play a crucial role in influencing firms by providing resources and legitimacy (Peng et al., 2005). Emerging markets face unique issues due to weak market institutions, in which adequate infrastructure is not provided (Doh et al., 2017; La Porta, 1999), hindering effective transactions (Meyer et al., 2009). Weak institutions can result in inequitable information flow, resource distribution, and enforcement of laws, leading to stagnation, corruption, lack of investment rigor, and low performance (Peng et al., 2008; Rodríguez-Pose & Zhang, 2020). Environmental activities can impact a firm's access to external resources, as providers can coerce firms to maintain their external legitimacy in order to obtain commitments or resources(Aerts et al., 2006; Lynall et al., 2003).

China's developmental imbalance, particularly in the eastern region, reflects differences in endowments, market infrastructures, and industrial environments, as well as access to financial services and digital finance impact (Wu & Huang, 2022). Regions with stronger

financial development more than provide a hotbed for the growth of new firms but additionally contribute to the development of established firms (Charfeddine & Zaouali, 2022). Chinese firms face institutional voids (Ahlstrom & Bruton, 2001), particularly in the financial market (Allen et al., 2005), due to underdeveloped systems (Yao & Yueh, 2009). The financing constraints imposed by weak financial institutions in China are causing significant pressure on Chinese firms to overcome these limitations (Yiu et al., 2013).

Baum et al. (2011) found that a good financial environment reduces barriers to external market financing, resulting in fewer financing constraints. Traditional financial systems must transform by establishing massive databases with digital finance to increase the efficiency of financial resource allocation. (Wang & Chen, 2023). The new model emerges from the rapid development of internet technology, addressing traditional finance's dilemma of efficient and sustainable financial solutions (Zhang et al., 2024).

Moderating Role of Digital Finance

According to IBV, firms develop better by responding to institutional pressures and gaining legitimacy (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). Financial development directly impacts financing constraints (Love, 2003; Naeem & Li, 2019). Firms in countries with poor financial development often face financing challenges (Fergusson, 2006), while improved financial development eases financing obstacles and promotes business expansion (Beck & Demirguc-Kunt, 2006).

In China, weak institutions lead to higher transaction costs and difficulty in obtaining financing (Wu, 2013), while developed institutions make it easier to obtain financing (Allen et al., 2005). China's uneven economic and social development and regional financial disparities in 31 provinces may lead to significant variations in the impact of digital finance on corporate investment efficiency (Huang et al., 2023).

Traditional financial systems have been replaced by digital finance (Gomber et al., 2017), utilizing information technology, big data, and cloud computing, providing a solid foundation for financing (Cao et al., 2021). Digital finance can significantly enhance the information asymmetry between companies and investors, leading to a reduction in financing constraints (Li et al., 2023; Yang et al., 2022). Digital finance offers decision-makers more comprehensive and relevant information for corporate investment (Nauhaus et al., 2021), thereby reducing financing constraints for firms compared to traditional finance modes (Huang et al., 2023). Using non-financial information, such as sales data, digital finance may boost financial service quality, reduce human intervention and rent-seeking (Zhang et al., 2024), and appraise enterprises more rapidly and accurately than conventional financial institutions (Gomber et al., 2017). Using big data to accurately assess firms, digital finance offers suitable financial products, optimizes credit processes to improve service quality, promotes the balance of market supply and demand, supports the real economy, and alleviates difficulties (Xu et al., 2023), thus lowering financing constraints.

Digital finance may benefit from digital technology solutions to lessen the requirement for cash in the stock market and facilitate firms to obtain external funding from financial intermediaries (Chang et al., 2023). Therefore, it weakens equity funds' reliance on stock markets and strengthens the marginal effect of institutional ownership on financing constraints.

In line with the above discussion, despite extensive research on the relationship between institutional ownership and financing constraints, little literature has addressed the

moderating role of digital finance as a variable. This study is based on the theory of institution-based view and proposes the following hypotheses:

Hypothesis 2 (H2): Digital finance enhances the mitigating effect of institutional ownership on financing constraints.

Research Design
Sample and Data Collection
The study selected firms listed on the Shanghai and Shenzhen A-share boards from 2011 to 2020 as research samples. In terms of data, all data comes from secondary sources. The sample data about institutional ownership and financing constraints index comes from the China Stock Market and Accounting Research Database (CSMAR). Meanwhile, the digital finance index comes from Peking University's Digital Finance Research Centre. It measures digital finance development at various levels, including province, city, and county levels, providing a comprehensive evaluation of digital financial practices (Li et al., 2023).

This study excluded financial corporations due to their distinct regulatory operating and environments from non-financial corporations. Also, the study excluded ST and *ST shares due to poor financial condition. The study excluded corporations with missing information, resulting in an unbalanced panel of 20,307 samples.

Dependent Variable
Common financing constraints indicators include investment-cash sensitivity (Almeida & Campello, 2007; Fazzari et al., 1988) and a combination of company features like KZ Index (Kaplan & Zingales, 1997), FC Index (Kuang et al., 2010), WW Index (Whited & Wu, 2006), and HP Index (Hadlock & Pierce, 2010).

The study uses the KZ index to measure financing constraints (FC). The KZ index construction employs a substantial amount of qualitative and quantitative data, making it more reliable than pre-classification variables for enterprise grouping (Xu et al., 2020). The KZ Index can provide precise financing constraints values for listed companies, enabling comparison of firms over different years (Ramezani, 2011).

Lamont et al. (2001) constructed an index using KZ's (Kaplan & Zingales, 1997) estimated coefficients for five variables to measure a firm's financing constraints. The greater the value of the KZ Index, the more financing constraints the firm has (Farooq et al., 2022; Hadlock & Pierce, 2010). The sample data is calculated using the following Equation 1 (Li, Wang, et al., 2023; Lin & Bo, 2012; Lopatta et al., 2017; Ronald et al., 2019; Wang, 2023):

$$KZ\ Index_{it} = -1.002 \times \frac{CF_{it}}{K_{it-1}} + 0.283 \times Q_{it} \qquad \text{Equation 1}$$
$$+ 3.139 \times Debt_{it} - 39.368 \times \frac{Dividends_{it}}{K_{it-1}}$$
$$- 1.315 \times \frac{Cash_{it}}{K_{it-1}}$$

Where
CF_{it}: cash flow variable for firm i at time t;
K_{it}: total assets for firm i at time t;
Q_{it}: Tobin's Q for firm i at time t;
$Debt_{it}$: ratio of total debt to total assets for firm i at time t;
$Cash_{it}$: amount of liquidity for firm i at time t.

Independent Variable

In this study, institutional ownership (INST) is measured as the percentage of financial and non-financial institutional shares in total outstanding shares, as used by Bathala et al. (1994) and Hayat et al. (2018).

The Moderating Effect of Digital Finance

The moderating variable in this study is the development level of digital finance (DF). Except for Hong Kong, Macao, and Taiwan, the Peking University Internet Finance Research Center's Digital Inclusive Finance Index (PKU_DFIIC) provides a more accurate picture of the growth of digital finance in Chinese provinces and cities (Li et al., 2020; Liu et al., 2022; Wang et al., 2020; Xiong et al., 2023; Li et al., 2022). The index comprises an overall index, using 33 secondary indicators from three refined dimensions (Liu et al., 2021): coverage breadth index, usage depth index, and inclusive finance digitalization degree index (Yang & Zhang, 2022). In this study, PKU_DFIIC (2011-2020) at the provincial level is adopted (Wang, 2022). Since dummy variables are a practical method for analyzing moderating effects (Dawson, 2014), the study measures DF dummy that equals one if the index exceeds the sample median and zero otherwise.

Control Variables

Several control variables that affect financing constraints are covered in this study. According to other studies (Blackwell & Kidwell, 1988; Houston & James, 1996; Winker, 1999), firm size (FSIZE), calculated as the natural logarithm of total assets, has a negative association with financing constraints. According to Beck et al. (2006), Hadlock & Pierce (2010), and Hope et al. (2011), firm age (FAGE), measured as the number of years since a corporation's initial listing on the CSMAR, is expected to find a negative association with financing constraints. Additionally, earlier studies revealed that financing constraints are lower in companies with higher profitability (Borisova & Megginson, 2011; Du & Geng, 2024; He et al., 2023). Profitability in this study using return on equity (ROE). Furthermore, this analysis uses board size (BSIZE) as a control variable, measured as the number of directors (Anderson et al., 2004; Ansong, 2015; Boone et al., 2007; Liu et al., 2021; Yang & Han, 2023). A broader board can enhance the ability to manage and utilize resources effectively and enable the firm's access to financial resources (Daily et al., 2002), thereby alleviating financing constraints (Ansong, 2015).

Empirical Methodology

The study first examines whether institutional ownership has an impact on financing constraints. To lessen the impact of outliers, all continuous variables were winsorized at 1% (top and bottom). Data analysis was conducted using Stata 17.0 statistical software. The three most popular regression methods are the Ordinary Least Squares (OLS), the Random Effects Model (REM), and the Fixed Effects Model (FEM). The findings of the LM test and Hausman test in this study show that, out of the three estimate methods, the Fixed Effects Model (FEM) produces the best results.

To test the potential heteroscedasticity of the linear regression model, this study uses the Breusch-Pagan test to get the result of rejecting the homoscedasticity null hypothesis. The EickerHuber-White heteroskedasticity consistent standard errors are used to correct the heteroscedasticity and provide the robust standard error.

Model 1 explains the association between institutional ownership and financing constraints. Model 2 investigates how institutional ownership and financing constraints link are moderated by digital finance. The same control variables are applied to both models. The baseline models are as follows:

$$FC_{it} = \alpha_0 + \alpha_1 INST_{it} + \alpha_2 FSIZE_{it} + \alpha_3 FAGE_{it} + \alpha_4 ROE_{it} \qquad \text{Model 1}$$
$$+ \alpha_5 BSIZE_{it} + \varepsilon_{it}$$

$$FC_{it} = \alpha_0 + \alpha_1 INST_{it} + \alpha_2 DF_{it} + \alpha_3 INST_{it} \times DF_{it} \qquad \text{Model 2}$$
$$+ \alpha_4 FSIZE_{it} + \alpha_5 FAGE_{it} + \alpha_6 ROE_{it}$$
$$+ \alpha_7 BSIZE_{it} + \varepsilon_{it}$$

Where
α_0 is a constant term and ε_{it} is the error term;
FC_{it}: Financing constraints, measured as the KZ index as shown in **Error! Reference source not found.** for firm i at time t.
$INST_{it}$: Institutional ownership, measured as the percentage of institutional shares in total outstanding shares for firm i at time t.
DF_{it}: Dummy variable for DF (value taking of 1 for DF > MEDIAN, otherwise 0). DF is an index measured at the provincial level of PKU_DFIIC (2011-2020).
$FSIZE_{it}$: Firm size, measured as the natural logarithm of total assets for firm i at time t.
$FAGE_{it}$: Firm age, measured as the natural logarithm of the difference between the year under investigation and the firm's year since a corporation's initial listing on the CSMAR plus one.
ROE_{it}: Return on equity, net profit divided by average total net assets for firm i at time t.
$BSIZE_{it}$: Board size, measured as the number of directors for firm i at time t.

Results
Descriptive Statistics
Table 1(a) lists descriptive statistics of the continuous variables. The maximum value of the dependent variable FC is positive, while the minimum value is negative. The mean value of the KZ index is 1.207, and the standard deviation is 2.266, indicating that significant variation exists across firms concerning their financing constraints. The maximum value of institutional ownership (INST) is 3.930, and the minimum value is 0.007, with a mean value of 0.690, demonstrating substantial variances in financing constraints across various Chinese listed firms. Furthermore, the maximum value of the firm size is 256.109, and the minimum value is 0.446, with a mean value of 13.912. In this study, the firm size will be measured as the natural logarithm of total assets, denoted as FSIZE. The maximum value of the firm age is 26.000, and the minimum value is 1.000, with a mean value of 10.730. The firm age will also be taken from the natural logarithm of the difference between the years since the survey and the company's first listing on the CSMAR plus one, denoted as FAGE. The maximum value of the return on equity (ROE) is 0.351, and the minimum value is -0.564, with a mean value of 0.065. The maximum value of the board size (BSIZE) is 15.000, and the minimum value is 5.000, with a mean value of 8.674. With the original score data, the maximum value of the moderating variable DF based on PKU_DFIIC at the provincial level is 431.928, while the minimum value is 16.220, the mean value of DF is 243.427, and the standard deviation is 98.953, indicating that significant variation exists across provinces concerning their development of digital finance. Table 1(b) shows that 10,147 (49.97 percent) firms' digital finance index based on PKU_DFIIC are larger than the median value. Meanwhile, 10,160 (50.03 percent) firms report a smaller digital finance index than the median value.

Table 1(a)
Descriptive Statistics of the Continuous Variables

Variable Description	Unit of measurement	Obs	Mean	SD	Min	Median	Max
Financing Constraints	Number of	20,307	1.207	2.266	-5.472	1.425	6.328
Institutional Ownership	Ratio	20,307	0.690	0.641	0.007	0.553	3.930
Firm Size	Billion RMB	20,307	13.912	34.653	0.446	3.811	256.109
Firm Age	Number of Years	20,307	10.730	7.137	1.000	9.000	26.000
Return On Equity	Ratio	20,307	0.065	0.120	-0.564	0.070	0.351
Board Size	Number of	20,307	8.674	1.707	5.000	9.000	15.000
PKU_DFIIC	Number of	20,307	243.427	98.953	16.220	245.210	431.928

Table 1(b)
Descriptive Statistics for the Dummy Variables

VARIABLES	Number of publicly listed companies	
	Frequency of 1s	Frequency of 0s
DF	10147 (49.97%)	10160 (50.03%)

Correlation Analysis
Table 2 displays the Pearson correlation matrix for variables. It reveals that institutional ownership significantly negatively impacts financing constraints, under the initial hypothesis. However, further regression tests should be carried out to explore this relationship in greater detail. Furthermore, the variables FSIZE and FAGE are significantly and positively correlated with FC, indicating that an increase in firm size and age increases the level of financing constraints. Additionally, a significant negative correlation exists between ROE and FC, suggesting that an increase in ROE leads to a reduction in FC within the company. As for the relationship between board size (BSIZE) and FC, there is a positive linear correlation.

Table 2
Pearson Correlation Matrix

	FC	INST	FSIZE	FAGE	ROE	BSIZE
FC	1					
INST	-0.118***	1				
FSIZE	0.122***	0.219***	1			
FAGE	0.286***	-0.116***	0.391***	1		
ROE	-0.357***	0.162***	0.117***	-0.084***	1	
BSIZE	0.051***	0.113***	0.267***	0.135***	0.034***	1

Notes: ***, **, and * indicate significance at 1%, 5% and 10%; FC= Financing constraints, calculated according to Equation 1; INST= The percentage of institutional shares in total outstanding shares; FSIZE= Natural log of total assets; FAGE= Natural log of the year difference

between the survey since and a corporation's initial listing on the CSMAR plus one; ROE= Net profit divided by average total net assets; BSIZE= The number of directors.

Empirical Tests and Discussion of the Impact of Institutional Ownership on Financing Constraints

The regression results in Model 5 reveal that after controlling for time and firm-level fixed effects, institutional ownership (INST) has a negative and significant impact on REM at a 1% significance level, with a coefficient of -0.3108. This suggests that higher ownership concentration is associated with lower levels of FC, thus confirming hypothesis H1, which posits that institutional ownership decreases financing constraints. Our empirical findings show that institutional ownership in China negatively correlates with FC, which matches previous research (Bai et al., 2022; Lin et al., 2011; Zhao et al., 2023), supporting the resource-based view theory. Firm age (FAGE) exhibits a positive and significant impact on FC at a 1% significance level, signifying that older firm suffers more FC, which is consistent with the findings of (Mushtaq et al., 2022). Return on equity (ROE) has a negative and significant effect on FC at a 1% significance level, indicating that ROE acts as an inhibitor of FC, which agrees with the research of Chong et al. (2013) and Zhao et al. (2023).

Model 6 shows the results of the moderating effect. The interaction term between institutional ownership and digital finance negatively affects FC with a coefficient of -0.1323 at a 5% significance level. The result indicates that digital finance negatively moderates the negative impact of institutional ownership on FC, implying that a higher level of digital finance promotes the mitigating effect of institutional ownership on financing constraints. This result confirms hypothesis H2, indicating that digital finance can help mitigate the impact of institutional ownership on financing constraints.

Table 3

The effect of institutional ownership on financing constraints

	OLS Model 1	OLS Model 2	REM Model 3	REM Model 4	FEM Model 5	FEM Model 6
INST	-0.2097***	-0.2253***	-0.2509***	-0.1970***	-0.3108***	-0.2741***
	(0.0235)	(0.0302)	(0.0236)	(0.0273)	(0.0375)	(0.0409)
DF		-0.4229***		-0.2761***		0.1207*
		(0.0422)		(0.0372)		(0.0622)
INST×DF		-0.0518		-0.2353***		-0.1323**
		(0.0446)		(0.0391)		(0.0594)
FSIZE	0.1510***	0.2005***	-0.1303***	-0.0151	-0.0640	-0.0490
	(0.0127)	(0.0130)	(0.0194)	(0.0202)	(0.0532)	(0.0531)
FAGE	0.6460***	0.6515***	0.4955***	0.5891***	2.0749***	2.0519***
	(0.0213)	(0.0212)	(0.0307)	(0.0312)	(0.0932)	(0.0930)
ROE	-6.4040***	-6.4676***	-4.2101***	-4.2570***	-4.0133***	-3.9995***
	(0.121)	(0.120)	(0.108)	(0.108)	(0.154)	(0.154)
BSIZE	0.0224***	0.0020	0.0934***	0.0638***	0.0067	0.0064

	(0.00866)	(0.00872)	(0.0110)	(0.0111)	(0.0160)	(0.0160)
Constant	-	-	**2.5689*****	0.2768	0.6992	0.3818
	3.2430***	**3.9423*****				
	(0.257)	(0.261)	(0.395)	(0.411)	(1.109)	(1.108)
Observations	20,307	20,307	20,307	20,307	20,307	20,307
R-squared	0.201	0.211			0.265	0.266
Firm FE	NO	NO			YES	YES
Year FE	NO	NO			YES	YES

Notes: ***, ** and * indicate significant at 1%, 5%, and 10%; FC= Financing constraints, calculated according to Equation 1; INST= The percentage of institutional shares in total outstanding shares; DF= Digital finance, a dummy that equals 1 if the Peking University Digital Financial Inclusion Index of China (PKU_DFIIC) at the provincial level is greater than the sample median and 0 otherwise; FSIZE= Natural log of total assets; FAGE= Natural log of the year difference between the survey since and a corporation's initial listing on the CSMAR plus one; ROE= Net profit divided by average total net assets; BSIZE= The number of directors. Robust standard errors grouped at the firm level are reported in parentheses.

Robustness Test

This study substituted the independent and dependent variables for testing with a modified variable measurement method in order to examine the robustness of empirical analysis. The independent variable, INST, is replaced by using the percentage of institutional shares in total shares (INST[1]) (Song et al., 2016). The dependent variable, FC, is replaced with the FC index (FC[1]) (Wu & Huang, 2022; Li et al., 2023; Wang, 2023; Li & Chen, 2024). The CSMAR database creates the FC index for Chinese-listed enterprises, the instructions are as follows.

(1) By standardizing firm size, age, and cash dividend payout ratio yearly and sorting them in ascending order, with the higher and lower quartiles splitting the magnitude of the financing constraints. (2) The financing constraints dummy variable, QUFC, is set to 0 for low financing constraints in listed companies above the 66% quantile and 1 for high constraints in listed companies below the 33% quantile. (3) Using the logarithm of firm size, leverage, market-to-book ratio, standardized dividend payout ratio, and EBIT, the logit regression equation as illustrated in Equation 2 and Equation 3, is used to estimate the probability of a firm's financing constraints each year. This is known as the FC index, with a larger index indicating more severe financing constraints.

$$P(QUFC = 1 \text{ or } 0 | Z_{it}) = \frac{e^{Z_{it}}}{1 + e^{Z_{it}}} \qquad \text{Equation 2}$$

Where

$$Z_{it} = \alpha_0 + \alpha_1 size_{it} + \alpha_2 lev_{it} + \alpha_3 \left(\frac{CashDiv}{TA}\right)_{it} + \alpha_4 MB_{it} \qquad \text{Equation 3}$$

$$+ \alpha_5 \left(\frac{NWC}{TA}\right)_{it} + \alpha_6 \left(\frac{EBIT}{TA}\right)_{it}$$

$size_{it}$: natural logarithm of the total assets for firm i at time t;
lev_{it}: financial leverage ratio for firm i at time t;
$CashDiv$: firm's cash dividends announced in the year t;
MB_{it}: market-to-book ratio for firm i at time t;
NWC: firm's net working capital;

$EBIT$: firm's earnings before interest and tax in the year t;

TA: firm's total assets in the year t.

As for the moderating variable, the measurement of moderator DF in the benchmark regression is moved from the provincial-level DF to the municipal-level index DF and create a dummy that equals 1 if the Peking University Digital Financial Inclusion Index of China (PKU_DFIIC) at the municipal level is greater than the sample median and 0 otherwise (DF^1). Table 4 shows that the proportion of shareholding by the domestic institutional ownership has a negative correlation with FC^1 at a 1% significance level, indicating that domestic institutional ownership alleviates financing constraints, thus validating hypothesis H1. After introducing DF^1, the interaction term between the proportion of shareholding by the domestic institutional ownership and DF^1 ($INST^1 \times DF^1$) exhibits a negative correlation with FC^1 at a 1% significance level, with a coefficient of -0.0408. This suggests that digital finance can intensify the impact of institutional ownership on financing constraints, further validating hypothesis H2.

Table 4
Robustness Test

VARIABLES	FEM Model 1	FEM Model 2
$INST^1$	**-0.0452*****	**-0.0327****
	(0.0149)	(0.0153)
DF^1		**0.0098***
		(0.00566)
$INST^1 \times DF^1$		**-0.0408*****
		(0.00977)
FSIZE	**-0.1701*****	**-0.1694*****
	(0.00517)	(0.00514)
FAGE	**-0.1528*****	**-0.1586*****
	(0.00625)	(0.00646)
ROE	**0.2126*****	**0.2155*****
	(0.0131)	(0.0131)
BSIZE	0.0012	0.0012
	(0.00137)	(0.00137)
Constant	**4.4679*****	**4.4565*****
	(0.106)	(0.105)
Observations	20,307	20,307
R-squared	0.460	0.462
Firm FE	YES	YES
Year FE	YES	YES

Notes: ***, **, and * indicate significance at 1%, 5%, and 10%; FC^1= Financing constraints, calculated according to Equation 2 and Equation 3; $INST^1$= The percentage of institutional shares in total shares; DF^1= Digital finance, a dummy that equals 1 if the Peking University Digital Financial Inclusion Index of China (PKU_DFIIC) at the municipal level is greater than the sample median and 0 otherwise; FSIZE= Natural log of total assets; FAGE= The number of years since a corporation's initial listing on the CSMAR; ROE= Net profit divided by average

total net assets; BSIZE= The number of directors. Robust standard errors grouped at the firm level are reported in parentheses.

Conclusion

Financing constraints are the primary obstacle to enterprise development, hindering their business performance improvement and value increase (Xu et al., 2023). In the current surroundings, digital finance provides new options for overcoming financial constraints. We investigate the impact of ownership structure on corporate financing constraints through the lens of the moderating effect of digital finance. This study examines data on A-share listed companies in China from 2011 to 2020, revealing the following findings.

First, the analysis results of this study show that institutional ownership is negatively correlated with the financing constraints of firms. The resource-based theory suggests that a firm's resource empowerment is strongly related to its ownership structure (Fernández & Nieto, 2006). Institutional investors can provide valuable resources like financial capital, and bring a broad spectrum of useful resources to the firm, such as financial capital. Consequently, it is helpful to ease the financing constraints of firms.

Second, according to institutional theory, in regions where digital finance is more developed, the negative impact of institutional ownership on corporate financing constraints will be enhanced. A good financial environment will reduce the external obstacles to the development of enterprises and alleviate the financing constraints of firms (Beck, 2007; Beck & Demirguc-Kunt, 2006; Zhang et al., 2020). This paper evaluates the positive impact of digital finance in China, highlighting its global leadership in this field. The establishment of a digital financial market system is a key goal of China's financial system reform (Zhang et al., 2024).

Based on the findings, the study presents important recommendations for the Chinese government and firms. The government should foster the establishment of a robust digital financial infrastructure to improve the efficiency of financial services by balancing supply and demand, and ensuring the optimal allocation of limited credit resources. To foster an inclusive financial market, the government should support firms operating in central and western regions, as well as those with limited financing access and high external financing attachment. The central and regional governments are tasked with the crucial task of developing formal financial institutions to decrease the financing transaction costs of Chinese firms (Cai et al., 2022). Firms need to utilize digital finance resources and state support for development and Use digital technologies to improve their viability and entrepreneurial potential to reduce their financing constraints. Additionally, To gain access to valuable resources, firms should form and strengthen an ongoing relationship with institutional investors who own ownership of them. Moreover, firms should embrace digital transformation, strengthen their credit systems, increase transparency, maintain their status, reduce corporate defaults, and facilitate their access to financing.

Three contributions are added to the earlier research in this paper. Firstly, this paper introduces a fresh theoretical framework that utilizes the resource-based view theory. It elaborates on the theoretical mechanism that higher institutional ownership leads to lower financing constraints. Secondly, based on the data of China's listed firms from 2011 to 2020 and The Peking University Digital Financial Inclusion Index of China, this paper pays attention from the firm level to examine the moderating effect of digital finance. It further supports the institution-based view theory. Thirdly, it provides insights for governments and enterprises to alleviate financing constraints from the perspective of ownership structure and regional financial development.

As with any other empirical study, there are some limitations to this study. First, this study focuses only on institutional ownership, future research may cover other forms of ownership, such as foreign ownership and management ownership, which may influence financing constraints. Second, the study does not take into account the moderating effect of other exogenous institutional triggers in China, such as market maturity. Therefore, these variables may be taken into subsequent research.

References

Aerts, W., Cormier, D., & Magnan, M. (2006). Intra-industry imitation in corporate environmental reporting: An international perspective. *Journal of Accounting and Public Policy*, *25*(3), 299–331. https://doi.org/10.1016/j.jaccpubpol.2006.03.004

Ahlstrom, D., & Bruton, G. D. (2001). Learning from successful local private firms in China: Establishing legitimacy. *Academy of Management Perspectives*, *15*(4), 72–83. https://doi.org/10.5465/ame.2001.5897661

Allen, F., Qian, J., & Qian, M. (2005). Law, finance, and economic growth in China. *Journal of Financial Economics*, *77*(1), 57–116. https://doi.org/10.1016/j.jfineco.2004.06.010

Allen, F., Qian, J. "Qj," Zhang, C., & Zhao, M. (2012). *China's Financial System: Opportunities and Challenges* (w17828; p. w17828). National Bureau of Economic Research. https://doi.org/10.3386/w17828

Almeida, H., & Campello, M. (2007). Financial Constraints, Asset Tangibility, and Corporate Investment. *Review of Financial Studies*, *20*(5), 1429–1460. https://doi.org/10.1093/rfs/hhm019

Amit, R., & Schoemaker, P. J. H. (1993). Strategic assets and organizational rent. *Strategic Management Journal*, *14*(1), 33–46. https://doi.org/10.1002/smj.4250140105

Anderson, R. C., Mansi, S. A., & Reeb, D. M. (2004). Board characteristics, accounting report integrity, and the cost of debt. *Journal of Accounting and Economics*, *37*(3), 315–342. https://doi.org/10.1016/j.jacceco.2004.01.004

Ansong, A. (2015). Board Size, Intensity of Board Activity, and Financial Performance of SMEs: Examining the Mediating Roles of Access to Capital and Firm Reputation. *Journal of Entrepreneurship and Business*, *3*(2), 26–41. https://doi.org/10.17687/JEB.0302.03

Awan, U., Shamim, S., Khan, Z., Zia, N. U., Shariq, S. M., & Khan, M. N. (2021). Big data analytics capability and decision-making: The role of data-driven insight on circular economy performance. *Technological Forecasting and Social Change*, *168*, 120766. https://doi.org/10.1016/j.techfore.2021.120766

Awan, U., Sroufe, R., & Shahbaz, M. (2021). Industry 4.0 and the circular economy: A literature review and recommendations for future research. *Business Strategy and the Environment*, *30*(4), 2038–2060. https://doi.org/10.1002/bse.2731

Bai, X., Han, J., Ma, Y., & Zhang, W. (2022). ESG performance, institutional investors' preference and financing constraints: Empirical evidence from China. *Borsa Istanbul Review*, *22*, S157–S168. https://doi.org/10.1016/j.bir.2022.11.013

Barber, B. M., & Odean, T. (2008). All That Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors. *Review of Financial Studies*, *21*(2), 785–818. https://doi.org/10.1093/rfs/hhm079

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Barney, J. B. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of Management*, *27*(6), 643–650. https://doi.org/10.1177/014920630102700602

Barney, J. B., & Hesterly, W. S. (2019). *Strategic management and competitive advantage: Concepts and cases (4th ed.)*. Pearson.

Bathala, C. T., Moon, K. P., & Rao, R. P. (1994). Managerial Ownership, Debt Policy, and the Impact of Institutional Holdings: An Agency Perspective. *Financial Management*, *23*(3), 38. https://doi.org/10.2307/3665620

Baum, C. F., Schäfer, D., & Talavera, O. (2011). The impact of the financial system's structure on firms' financial constraints. *Journal of International Money and Finance*, *30*(4), 678–691. https://doi.org/10.1016/j.jimonfin.2011.02.004

Beck, T. (2007). *Financing Constraints of SMEs in Developing Countries: Evidence, Determinants and Solutions*.

Beck, T., & Demirguc-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking & Finance*, *30*(11), 2931–2943. https://doi.org/10.1016/j.jbankfin.2006.05.009

Beck, T., Demirgüç-Kunt, A., Laeven, L., & Maksimovic, V. (2006). The determinants of financing obstacles. *Journal of International Money and Finance*, *25*(6), 932–952. https://doi.org/10.1016/j.jimonfin.2006.07.005

Beck, T., Pamuk, H., Ramrattan, R., & Uras, B. R. (2018). Payment instruments, finance and development. *Journal of Development Economics*, *133*, 162–186. https://doi.org/10.1016/j.jdeveco.2018.01.005

Bhatia, P., & Chakrabarti, P. (2022). Does group affiliation impact financial constraints? Evidence from India. *Managerial Finance*, *48*(6), 917–938. https://doi.org/10.1108/MF-08-2021-0392

Bird, A., & Karolyi, S. A. (2016). Do Institutional Investors Demand Public Disclosure? *Review of Financial Studies*, *29*(12), 3245–3277. https://doi.org/10.1093/rfs/hhw062

Bisht, D., Singh, R., Gehlot, A., Akram, S. V., Singh, A., Montero, E. C., Priyadarshi, N., & Twala, B. (2022). Imperative Role of Integrating Digitalization in the Firms Finance: A Technological Perspective. *Electronics*, *11*(19), 3252. https://doi.org/10.3390/electronics11193252

Blackwell, D. W., & Kidwell, D. S. (1988). An investigation of cost differences between public sales and private placements of debt. *Journal of Financial Economics*, *22*(2), 253–278. https://doi.org/10.1016/0304-405X(88)90071-2

Boone, A. L., Casares Field, L., Karpoff, J. M., & Raheja, C. G. (2007). The determinants of corporate board size and composition: An empirical analysis. *Journal of Financial Economics*, *85*(1), 66–101. https://doi.org/10.1016/j.jfineco.2006.05.004

Borisova, G., & Megginson, W. L. (2011). Does Government Ownership Affect the Cost of Debt? Evidence from Privatization. *Review of Financial Studies*, *24*(8), 2693–2737. https://doi.org/10.1093/rfs/hhq154

Borochin, P., & Yang, J. (2017). The effects of institutional investor objectives on firm valuation and governance. *Journal of Financial Economics*, *126*(1), 171–199. https://doi.org/10.1016/j.jfineco.2017.06.013

Cai, H., Fang, H., & Xu, L. C. (2011). Eat, Drink, Firms, Government: An Investigation of Corruption from the Entertainment and Travel Costs of Chinese Firms. *The Journal of Law and Economics*, *54*(1), 55–78. https://doi.org/10.1086/651201

Cai, R., Yun, K. H., & Kim, M. (2022). Financing Constraints and Corporate Value in China: The Moderating Role of Multinationality and Ownership Type. *Sustainability*, *14*(19), 12297. https://doi.org/10.3390/su141912297

Cao, S., Nie, L., Sun, H., Sun, W., & Taghizadeh-Hesary, F. (2021). Digital finance, green technological innovation and energy-environmental performance: Evidence from China's regional economies. *Journal of Cleaner Production*, *327*, 129458. https://doi.org/10.1016/j.jclepro.2021.129458

Cao, Y., Dong, Y., Lu, Y., & Ma, D. (2020). Does Institutional Ownership Improve Firm Investment Efficiency? *Emerging Markets Finance and Trade*, *56*(12), 2772–2792. https://doi.org/10.1080/1540496X.2018.1486705

Capron, L., & Hulland, J. (1999). Redeployment of Brands, Sales Forces, and General Marketing Management Expertise Following Horizontal Acquisitions: A Resource-Based View. *Journal of Marketing*, *63*(2), 41–54. https://doi.org/10.1177/002224299906300203

Chang, K., Cheng, X., Wang, Y., Liu, Q., & Hu, J. (2023). The impacts of ESG performance and digital finance on corporate financing efficiency in China. *Applied Economics Letters*, *30*(4), 516–523. https://doi.org/10.1080/13504851.2021.1996527

Charfeddine, L., & Zaouali, S. (2022). The effects of financial inclusion and the business environment in spurring the creation of early-stage firms and supporting established firms. *Journal of Business Research*, *143*, 1–15. https://doi.org/10.1016/j.jbusres.2022.01.014

Chatterjee, S., Gu, X., Hasan, I., & Lu, H. (2023). Ownership structure and the cost of debt: Evidence from the Chinese corporate bond market. *Journal of Empirical Finance*, *73*, 334–348. https://doi.org/10.1016/j.jempfin.2023.08.003

Chen, H.-L., Hsu, W.-T., & Chang, C.-Y. (2014). Family Ownership, Institutional Ownership, and Internationalization of SMEs: Journal of Small Business Management. *Journal of Small Business Management*, *52*(4), 771–789. https://doi.org/10.1111/jsbm.12031

Chen, Y., & Bellavitis, C. (2020). Blockchain disruption and decentralized finance: The rise of decentralized business models. *Journal of Business Venturing Insights*, *13*, e00151. https://doi.org/10.1016/j.jbvi.2019.e00151

Chen, Y., Huang, Y., & Wen, M. (2024). Accounts Receivable Reform and Financing Constraints: Evidence from China's A-Share Market. *Emerging Markets Finance and Trade*, 1–26. https://doi.org/10.1080/1540496X.2023.2298255

Chen, Y., Li, Q., Ng, J., & Wang, C. (2021). Corporate financing of investment opportunities in a world of institutional cross-ownership. *Journal of Corporate Finance*, *69*, 102041. https://doi.org/10.1016/j.jcorpfin.2021.102041

Chi, J., Liao, J., & Yang, J. (2019). Institutional stock ownership and firm innovation: Evidence from China. *Journal of Multinational Financial Management*, *50*, 44–57. https://doi.org/10.1016/j.mulfin.2019.04.003

Chong, T. T.-L., Lu, L., & Ongena, S. (2013). Does banking competition alleviate or worsen credit constraints faced by small- and medium-sized enterprises? Evidence from China. *Journal of Banking & Finance*, *37*(9), 3412–3424. https://doi.org/10.1016/j.jbankfin.2013.05.006

Chung, R., Firth, M., & Kim, J.-B. (2002). Institutional monitoring and opportunistic earnings management. *Journal of Corporate Finance*, *8*(1), 29–48. https://doi.org/10.1016/S0929-1199(01)00039-6

Daily, C. M., McDougall, P. P., Covin, J. G., & Dalton, D. R. (2002). Governance and Strategic Leadership in Entrepreneurial Firms. *Journal of Management*, *28*(3), 387–412. https://doi.org/10.1177/014920630202800307

Dawson, J. F. (2014). Moderation in Management Research: What, Why, When, and How. *Journal of Business and Psychology*, *29*(1), 1–19. https://doi.org/10.1007/s10869-013-9308-7

Day, G. S. (1994). The Capabilities of Market-Driven Organizations. *Journal of Marketing*, *58*(4), 37–52. https://doi.org/10.1177/002224299405800404

Day, G. S., & Wensley, R. (1988). Assessing Advantage: A Framework for Diagnosing Competitive Superiority. *Journal of Marketing*, *52*(2), 1–20. https://doi.org/10.1177/002224298805200201

De La O, G., & Matis, T. (2014). Supply Chain Strategies for the International Interoceanic Mazatlan-Houston Logistic Corridor. *Journal of Applied Research and Technology*, *12*(4), 666–673. https://doi.org/10.1016/S1665-6423(14)70083-5

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review*, *48*(2), 147. https://doi.org/10.2307/2095101

Doh, J., Rodrigues, S., Saka-Helmhout, A., & Makhija, M. (2017). International business responses to institutional voids. *Journal of International Business Studies*, *48*(3), 293–307. https://doi.org/10.1057/s41267-017-0074-z

Du, J., Guariglia, A., & Newman, A. (2015). Do Social Capital Building Strategies Influence the Financing Behavior of Chinese Private Small and Medium–Medium-sized enterprises? *Entrepreneurship Theory and Practice*, *39*(3), 601–631. https://doi.org/10.1111/etap.12051

Du, L., & Geng, B. (2024). Financial technology and financing constraints. *Finance Research Letters*, *60*, 104841. https://doi.org/10.1016/j.frl.2023.104841

Eaton, T. V., Nofsinger, J. R., & Varma, A. (2014). Institutional Investor Ownership and Corporate Pension Transparency. *Financial Management*, *43*(3), 603–630. https://doi.org/10.1111/fima.12045

Farooq, M., Humayon, A. A., Khan, M. I., & Ali, S. (2022). Ownership structure and financial constraints – Evidence from an emerging market. *Managerial Finance*, *48*(7), 1007–1028. https://doi.org/10.1108/MF-12-2021-0620

Fazzari, S. M., Hubbard, R. G., Petersen, B. C., Blinder, A. S., & Poterba, J. M. (1988). Financing Constraints and Corporate Investment. *Brookings Papers on Economic Activity*, *1988*(1), 141. https://doi.org/10.2307/2534426

Fergusson, L. (2006). Institutions for Financial Development: What are they and where do they come from? *Journal of Economic Surveys*, *20*(1), 27–70. https://doi.org/10.1111/j.0950-0804.2006.00275.x

Fernández, Z., & Nieto, M. J. (2005). Internationalization Strategy of Small and Medium-Sized Family Businesses: Some Influential Factors. *Family Business Review*, *18*(1), 77–89. https://doi.org/10.1111/j.1741-6248.2005.00031.x

Fernández, Z., & Nieto, M. J. (2006). Impact of ownership on the international involvement of SMEs. *Journal of International Business Studies*, *37*(3), 340–351. https://doi.org/10.1057/palgrave.jibs.8400196

Foss, N. J., Klein, P. G., Lien, L. B., Zellweger, T., & Zenger, T. (2021). Ownership competence. *Strategic Management Journal*, *42*(2), 302–328. https://doi.org/10.1002/smj.3222

García-Meca, E., López-Iturriaga, F., & Tejerina-Gaite, F. (2017). Institutional Investors on Boards: Does Their Behavior Influence Corporate Finance? *Journal of Business Ethics*, *146*(2), 365–382. https://doi.org/10.1007/s10551-015-2882-z

Garrido, E., Gomez, J., Maicas, J. P., & Orcos, R. (2014). The institution-based view of strategy: How to measure it. *BRQ Business Research Quarterly*, *17*(2), 82–101. https://doi.org/10.1016/j.brq.2013.11.001

Ge, Y., & Qiu, J. (2007). Financial development, bank discrimination and trade credit. *Journal of Banking & Finance*, *31*(2), 513–530. https://doi.org/10.1016/j.jbankfin.2006.07.009

George, G., Wiklund, J., & Zahra, S. A. (2005). Ownership and the Internationalization of Small Firms. *Journal of Management*, *31*(2), 210–233. https://doi.org/10.1177/0149206304271760

Goergen, M., & Renneboog, L. (2001). Investment policy, internal financing and ownership concentration in the UK. *Journal of Corporate Finance*, *7*(3), 257–284. https://doi.org/10.1016/S0929-1199(01)00022-0

Goldstein, I., Jiang, W., & Karolyi, G. A. (2019). To FinTech and Beyond. *The Review of Financial Studies*, *32*(5), 1647–1661. https://doi.org/10.1093/rfs/hhz025

Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the Fintech Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services. *Journal of Management Information Systems*, *35*(1), 220–265. https://doi.org/10.1080/07421222.2018.1440766

Gomber, P., Koch, J.-A., & Siering, M. (2017). Digital Finance and FinTech: Current research and future research directions. *Journal of Business Economics*, *87*(5), 537–580. https://doi.org/10.1007/s11573-017-0852-x

Gruin, J., & Knaack, P. (2020). Not Just Another Shadow Bank: Chinese Authoritarian Capitalism and the 'Developmental' Promise of Digital Financial Innovation. *New Political Economy*, *25*(3), 370–387. https://doi.org/10.1080/13563467.2018.1562437

Guo, F. (2023). Countermeasures and Suggestions on Wenzhou Digital Empowerment to Boost Economic Vitality after The Epidemic. *Frontiers in Business, Economics and Management*, *9*(3), 172–175. https://doi.org/10.54097/fbem.v9i3.9581

Guo, H., Zhou, Y., & Cui, W. (2020). An Empirical Study on the Financial Development Differences of Chinese Port Cities along the New Maritime Silk Road. *Journal of Coastal Research*, *107*(sp1), 341. https://doi.org/10.2112/JCR-SI107-079.1

Hadlock, C. J., & Pierce, J. R. (2010). New Evidence on Measuring Financial Constraints: Moving Beyond the KZ Index. *Review of Financial Studies*, *23*(5), 1909–1940. https://doi.org/10.1093/rfs/hhq009

Harrison, A. E., Love, I., & McMillan, M. S. (2004). Global capital flows and financing constraints. *Journal of Development Economics*, *75*(1), 269–301. https://doi.org/10.1016/j.jdeveco.2003.10.002

Hayat, M., Yu, Y., Wang, M., & Jebran, K. (2018). Impact of Managerial and Institutional Ownership on Capital Structure: A Comparison Between China & USA. *European Journal of Business and Management*.

He, J., Du, X., & Tu, W. (2023). Can corporate digital transformation alleviate financing constraints? *Applied Economics*, 1–17. https://doi.org/10.1080/00036846.2023.2187037

Hope, O.-K., Thomas, W., & Vyas, D. (2011). Financial credibility, ownership, and financing constraints in private firms. *Journal of International Business Studies*, *42*(7), 935–957. https://doi.org/10.1057/jibs.2011.23

Houston, J., & James, C. (1996). Bank Information Monopolies and the Mix of Private and Public Debt Claims. *The Journal of Finance*, *51*(5), 1863–1889. https://doi.org/10.1111/j.1540-6261.1996.tb05229.x

Huang, G., & Song, F. M. (2006). The determinants of capital structure: Evidence from China. *China Economic Review*, *17*(1), 14–36. https://doi.org/10.1016/j.chieco.2005.02.007

Huang, Z., Tao, Y., Luo, X., Ye, Y., & Lei, T. (2023). Regional digital finance and corporate investment efficiency in China. *Applied Economics*, *55*(43), 5115–5134. https://doi.org/10.1080/00036846.2022.2136616

Hui, P., Zhao, H., Liu, D., & Li, Y. (2023). How does digital finance affect regional innovation capacity? A spatial econometric analysis. *Economic Modelling*, *122*, 106250. https://doi.org/10.1016/j.econmod.2023.106250

Hussin, F., & Yoke Yik, S. (2012). The Contribution of Economic Sectors to Economic Growth: The Cases of China and India. *Research in Applied Economics*, *4*(4), p38–p53. https://doi.org/10.5296/rae.v4i4.2879

Ismail, M. A., Ibrahim, M. H., Yusoff, M., & Zainal, M.-P. (2010). Financial Constraints and Firm Investment in Malaysia: An Investigation of Investment- Cash Flow Relationship. *International Journal of Economics and Management*, *4*(1), 29–44.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Jiang, L., Tong, A., Hu, Z., & Wang, Y. (2019). The impact of the inclusive financial development index on farmer entrepreneurship. *PLOS ONE*, *14*(5), e0216466. https://doi.org/10.1371/journal.pone.0216466

Julienti Abu Bakar, L., & Ahmad, H. (2010). Assessing the relationship between firm resources and product innovation performance: A resource-based view. *Business Process Management Journal*, *16*(3), 420–435. https://doi.org/10.1108/14637151011049430

Kaplan, S. N., & Zingales, L. (1997). Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints? *The Quarterly Journal of Economics*, *112*(1), 169–215. https://doi.org/10.1162/003355397555163

Kozlenkova, I. V., Samaha, S. A., & Palmatier, R. W. (2014). Resource-based theory in marketing. *Journal of the Academy of Marketing Science*, *42*(1), 1–21. https://doi.org/10.1007/s11747-013-0336-7

Kuang, X., Shi, Z., & He, E. (2010). Financing Constraints Index and Index Evaluation of Listed Companies in China. *Journal of Shanxi Finance and Economics University*, *32*(5), 110–117. https://doi.org/10.13781/j.cnki.1007-9556.2010.05.004

La Porta, R. (1999). The quality of government. *Journal of Law, Economics, and Organization*, *15*(1), 222–279. https://doi.org/10.1093/jleo/15.1.222

Lamont, O., Polk, C., & Saaá-Requejo, J. (2001). Financial Constraints and Stock Returns. *Review of Financial Studies*, *14*(2), 529–554. https://doi.org/10.1093/rfs/14.2.529

Lee, I., & Shin, Y. J. (2018). Fintech: Ecosystem, business models, investment decisions, and challenges. *Business Horizons*, *61*(1), 35–46. https://doi.org/10.1016/j.bushor.2017.09.003

Li, C., Wang, Y., Zhou, Z., Wang, Z., & Mardani, A. (2023). Digital finance and enterprise financing constraints: Structural characteristics and mechanism identification. *Journal of Business Research*, *165*, 114074. Q1. https://doi.org/10.1016/j.jbusres.2023.114074

Li, J., Wu, Y., & Xiao, J. J. (2020). The impact of digital finance on household consumption: Evidence from China. *Economic Modelling*, *86*, 317–326. https://doi.org/10.1016/j.econmod.2019.09.027

Li, Y., Tan, J., Wu, B., & Yu, J. (2022). Does digital finance promote entrepreneurship of migrant? Evidence from China. *Applied Economics Letters*, *29*(19), 1829–1832. https://doi.org/10.1080/13504851.2021.1963404

Li, Z., & Chen, J. (2024). Supplier innovativeness, supplier relationships, and enterprises' finance constraints. *Managerial and Decision Economics*, *45*(2), 652–663. https://doi.org/10.1002/mde.4028

Lin, C., Ma, Y., & Xuan, Y. (2011). Ownership structure and financial constraints: Evidence from a structural estimation. *Journal of Financial Economics*, *102*(2), 416–431. https://doi.org/10.1016/j.jfineco.2011.06.001

Lin, H.-C. M., & Bo, H. (2012). State-ownership and financial constraints on investment of Chinese-listed firms: New evidence. *The European Journal of Finance*, *18*(6), 497–513. https://doi.org/10.1080/1351847X.2011.611523

Liu, J., Jiang, Y., Gan, S., He, L., & Zhang, Q. (2022). Can digital finance promote corporate green innovation? *Environmental Science and Pollution Research*, *29*(24), 35828–35840. https://doi.org/10.1007/s11356-022-18667-4

Liu, Y., Luan, L., Wu, W., Zhang, Z., & Hsu, Y. (2021). Can digital financial inclusion promote China's economic growth? *International Review of Financial Analysis*, *78*, 101889. https://doi.org/10.1016/j.irfa.2021.101889

Liu, Z., Li, W., Hao, C., & Liu, H. (2021). Corporate environmental performance and financing constraints: An empirical study in the Chinese context. *Corporate Social Responsibility and Environmental Management*, *28*(2), 616–629. https://doi.org/10.1002/csr.2073

Lopatta, K., Jaeschke, R., Tchikov, M., & Lodhia, S. (2017). Corruption, Corporate Social Responsibility and Financial Constraints: International Firm-level Evidence. *European Management Review*, *14*(1), 47–65. https://doi.org/10.1111/emre.12098

Lou, Z., Xie, Q., Shen, J. H., & Lee, C.-C. (2024). Does Supply Chain Finance (SCF) alleviate funding constraints of SMEs? Evidence from China. *Research in International Business and Finance*, *67*, 102157. https://doi.org/10.1016/j.ribaf.2023.102157

Love, I. (2003). Financial Development and Financing Constraints: International Evidence from the Structural Investment Model. *Review of Financial Studies*, *16*(3), 765–791. Q1. https://doi.org/10.1093/rfs/hhg013

Lv, C., Bian, B., Lee, C.-C., & He, Z. (2021). Regional gap and the trend of green finance development in China. *Energy Economics*, *102*, 105476. https://doi.org/10.1016/j.eneco.2021.105476

Lynall, M. D., Golden, B. R., & Hillman, A. J. (2003). Board Composition from Adolescence to Maturity: A Multitheoretic View. *Academy of Management Review*, *28*(3), 416–431. https://doi.org/10.5465/amr.2003.10196743

Mahoney, J. T., & Pandian, J. R. (1992). The resource-based view within the conversation of strategic management. *Strategic Management Journal*, *13*(5), 363–380. https://doi.org/10.1002/smj.4250130505

Menkhoff, L., Schmeling, M., & Schmidt, U. (2010). Are All Professional Investors Sophisticated? *German Economic Review*, *11*(4), 418–440. https://doi.org/10.1111/j.1468-0475.2009.00497.x

Meyer, J. W., & Rowan, B. (1977). Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology*, *83*(2), 340–363. https://doi.org/10.1086/226550

Meyer, K. E., Estrin, S., Bhaumik, S. K., & Peng, M. W. (2009). Institutions, resources, and entry strategies in emerging economies. *Strategic Management Journal*, *30*(1), 61–80. https://doi.org/10.1002/smj.720

Mushtaq, R., Gull, A. A., & Usman, M. (2022). ICT adoption, innovation, and SMEs' access to finance. *Telecommunications Policy*, *46*(3), 102275. https://doi.org/10.1016/j.telpol.2021.102275

Naeem, K., & Li, M. C. (2019). Corporate investment efficiency: The role of financial development in firms with financing constraints and agency issues in OECD non-financial firms. *International Review of Financial Analysis*, *62*, 53–68. https://doi.org/10.1016/j.irfa.2019.01.003

Nauhaus, S., Luger, J., & Raisch, S. (2021). Strategic Decision Making in the Digital Age: Expert Sentiment and Corporate Capital Allocation. *Journal of Management Studies*, *58*(7), 1933–1961. https://doi.org/10.1111/joms.12742

Nguyen, L. T., & Nguyen, K. V. (2020). The impact of corporate social responsibility on the risk of commercial banks with different levels of financial constraint. *Asia-Pacific Journal of Business Administration*, *13*(1), 98–116. https://doi.org/10.1108/APJBA-12-2019-0252

North, D. C. (1990). *Institutions institutional change and economic performance.xdf*. Cambridge University Press.

Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review*, *18*(4), 329–340. https://doi.org/10.1016/j.bir.2017.12.003

Padmaja, M., & Sasidharan, S. (2021). Financing constraints and exports: Evidence from India. *Journal of Economics and Finance*, *45*(1), 118–145. https://doi.org/10.1007/s12197-020-09532-6

Panicker, V. S., Upadhyayula, R. S., & Sivakumar, S. (2022). Internationalization of hybrid state-owned enterprises from emerging markets: Institutional investors as enablers. *Journal of Business Research*, *151*, 409–422. https://doi.org/10.1016/j.jbusres.2022.07.018

Park, S. H., & Luo, Y. (2001). Guanxi and organizational dynamics: Organizational networking in Chinese firms. *Strategic Management Journal*, *22*(5), 455–477. https://doi.org/10.1002/smj.167

Peng, M. W. (2002). Towards an Institution-Based View of Business Strategy. *Asia Pacific Journal of Management*, *19*(2/3), 251–267. https://doi.org/10.1023/A:1016291702714

Peng, M. W., & Heath, P. S. (1996). The Growth of the Firm in Planned Economies in Transition: Institutions, Organizations, and Strategic Choice. *The Academy of Management Review*, *21*(2), 492. https://doi.org/10.2307/258670

Peng, M. W., Lee, S.-H., & Wang, D. Y. L. (2005). What Determines the Scope of the Firm Over Time? A Focus on Institutional Relatedness. *Academy of Management Review*, *30*(3), 622–633. https://doi.org/10.5465/amr.2005.17293731

Peng, M. W., Sun, S. L., Pinkham, B., & Chen, H. (2009). The Institution-Based View as a Third Leg for a Strategy Tripod. *Academy of Management Perspectives*, *23*(3), 63–81. https://doi.org/10.5465/amp.2009.43479264

Peng, M. W., Wang, D. Y. L., & Jiang, Y. (2008). An institution-based view of international business strategy: A focus on emerging economies. *Journal of International Business Studies*, *39*(5), 920–936. https://doi.org/10.1057/palgrave.jibs.8400377

Penrose, E. T. (2009). *The theory of the growth of the firm* (4th ed., Rev. ed). Oxford University Press.

Ramezani, C. A. (2011). Financial constraints, real options and corporate cash holdings. *Managerial Finance*, *37*(12), 1137–1160. https://doi.org/10.1108/03074351111175074

Rodríguez-Pose, A., & Zhang, M. (2020). The cost of weak institutions for innovation in China. *Technological Forecasting and Social Change*, *153*, 119937. https://doi.org/10.1016/j.techfore.2020.119937

Ronald, S., Ng, S., & Daromes, F. E. (2019). Corporate Social Responsibility as Economic Mechanism for Creating Firm Value. *Indonesian Journal of Sustainability Accounting and Management*, *3*(1), 22. https://doi.org/10.28992/ijsam.v3i1.69

Runyan, R. C., Huddleston, P., & Swinney, J. (2006). Entrepreneurial orientation and social capital as small firm strategies: A study of gender differences from a resource-based view. *The International Entrepreneurship and Management Journal*, *2*(4), 455–477. https://doi.org/10.1007/s11365-006-0010-3

Sasidharan, S., & Padmaja, M. (2018). Do Financing Constraints Impact Outward Foreign Direct Investment? Evidence from India. *Asian Development Review*, *35*(1), 108–132. https://doi.org/10.1162/adev_a_00107

Schain, J. P., & Stiebale, J. (2021). Innovation, institutional ownership and financial constraints. *Empirical Economics*, *61*(3), 1689–1697. https://doi.org/10.1007/s00181-020-01909-0

Schmidt, C., & Fahlenbrach, R. (2017). Do exogenous changes in passive institutional ownership affect corporate governance and firm value? *Journal of Financial Economics*, *124*(2), 285–306. https://doi.org/10.1016/j.jfineco.2017.01.005

Shi, Y., Li, J., & Liu, R. (2023). Financing constraints and share pledges: Evidence from the share pledge reform in China. *Journal of Corporate Finance*, *78*, 102337. https://doi.org/10.1016/j.jcorpfin.2022.102337

Shleifer, A., & Vishny, R. W. (1986). Large Shareholders and Corporate Control. *Journal of Political Economy*, *94*(3, Part 1), 461–488. https://doi.org/10.1086/261385

Song, Y., Gianiodis, P. T., & Li, Y. (2016). Institutional Ownership and Corporate Philanthropic Giving in an Emerging Economy. *Management and Organization Review*, *12*(2), 357–385. https://doi.org/10.1017/mor.2015.33

Tehseen, S., & Sajilan, S. (2016). Network competence based on resource-based view and resource dependence theory. *International Journal of Trade and Global Markets*, *9*(1), 60. https://doi.org/10.1504/IJTGM.2016.074138

Velte, P. (2024). Institutional ownership and board governance. A structured literature review on the heterogeneous monitoring role of institutional investors. *Corporate Governance: The International Journal of Business in Society*, *24*(2), 225–263. https://doi.org/10.1108/CG-10-2022-0414

Wan, G., Xie, L., Li, J., & Jiang, D. (2022). Entertainment Spending and Capturing Value from Innovation in Chinese Firms. *Management and Organization Review*, *18*(4), 623–657. https://doi.org/10.1017/mor.2021.65

Wang, C., Lok, C.-L., & Phua, L. K. (2023). Ownership Structure and Capital Structure: Moderating Effect of Product Market Maturity. *SAGE Open*, *13*(4), 21582440231218787. https://doi.org/10.1177/21582440231218787

Wang, C., Phua, L. K., & Lok, C.-L. (2023). The Moderating Effect of Labor Market Development on the Relationship between Ownership Structure and Capital Structure: Evidence from Chinese Listed Companies. *International Journal of Academic Research in Accounting,*

Finance and Management Sciences, *13*(1), Pages 136-152. https://doi.org/10.6007/IJARAFMS/v13-i1/16194

Wang, Q., Yang, J., Chiu, Y., & Lin, T. (2020). The impact of digital finance on financial efficiency. *Managerial and Decision Economics*, *41*(7), 1225–1236. https://doi.org/10.1002/mde.3168

Wang, Q., Yang, J., Chiu, Y., & Lin, T. (2023). Cross-regional comparative study on digital finance and finance efficiency in China: The eastern and non-eastern areas. *Managerial and Decision Economics*, *44*(1), 68–83. https://doi.org/10.1002/mde.3667

Wang, R. (2023). The Impact of Digital Financial Inclusion on Financing Constraints: Evidence from China's A-share Listed Companies. *Advances in Economics and Management Research*, *6*(1), 328. https://doi.org/10.56028/aemr.6.1.328.2023

Wang, X., & Chen, X. (2023). An empirical study on financing constraints of digital inclusive finance development on small and medium-sized technology-based enterprise. *Kybernetes*, *52*(2), 585–600. https://doi.org/10.1108/K-01-2022-0095

Wang, Y., Li, S., & Wang, Y. (2022). The Impact of Financing Constraints and Uncertainty on Manufacturing Innovation Efficiency: An Empirical Analysis from Chinese Listed Firms. *Mathematical Problems in Engineering*, *2022*, 1–13. https://doi.org/10.1155/2022/9006072

Wang, Z. (2022). Digital Finance, Financing Constraint and Enterprise Financial Risk. *Journal of Mathematics*, *2022*, 1–9. https://doi.org/10.1155/2022/2882113

Wei, J., Li, Y., Liu, X., & Du, Y. (2022). Enterprise characteristics and external influencing factors of sustainable innovation: Based on China's innovation survey. *Journal of Cleaner Production*, *372*, 133461. https://doi.org/10.1016/j.jclepro.2022.133461

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. https://doi.org/10.1002/smj.4250050207

Whited, T. M., & Wu, G. (2006). Financial Constraints Risk. *Review of Financial Studies*, *19*(2), 531–559. https://doi.org/10.1093/rfs/hhj012

Winker, P. (1999). Causes and Effects of Financing Constraints at the Firm Level. *Small Business Economics*, *12*(2), 169–181. https://doi.org/10.1023/A:1008035826914

Wong, Z., Chen, A., Taghizadeh-Hesary, F., Li, R., & Kong, Q. (2023). Financing Constraints and Firm's Productivity Under the COVID-19 Epidemic Shock: Evidence of A-Shared Chinese Companies. *The European Journal of Development Research*, *35*(1), 167–195. https://doi.org/10.1057/s41287-021-00501-1

Wu, J. (2013). Marketing capabilities, institutional development, and the performance of emerging market firms: A multinational study. *International Journal of Research in Marketing*, *30*(1), 36–45. https://doi.org/10.1016/j.ijresmar.2012.07.001

Wu, J., Si, S., & Wu, X. (2016). Entrepreneurial Finance and Innovation: Informal Debt as an Empirical Case. *Strategic Entrepreneurship Journal*, *10*(3), 257–273. https://doi.org/10.1002/sej.1214

Wu, Y., & Huang, S. (2022). The effects of digital finance and financial constraint on financial performance: Firm-level evidence from China's new energy enterprises. *Energy Economics*, *112*, 106158. https://doi.org/10.1016/j.eneco.2022.106158

Xiao, Q. (2023). State equity participation and financing constraints of private enterprises in China: Based on the competitive pressure perspective. *PLOS ONE*, *18*(11), e0292817. https://doi.org/10.1371/journal.pone.0292817

Xiong, M., Li, W., Xian, B. T. S., & Yang, A. (2023). Digital inclusive finance and enterprise innovation—Empirical evidence from Chinese listed companies. *Journal of Innovation & Knowledge*, *8*(1), 100321. https://doi.org/10.1016/j.jik.2023.100321

Xu, K., Geng, C., Wei, X., & Jiang, H. (2020). FINANCING DEVELOPMENT, FINANCING CONSTRAINT AND R&D INVESTMENT OF STRATEGIC EMERGING INDUSTRIES IN CHINA. *Journal of Business Economics and Management*, *21*(4), 1010–1034. https://doi.org/10.3846/jbem.2020.12727

Xu, Y., Wang, Y., Lu, F., & Sheng, D. (2023). A study of the impact of digital inclusive finance on firm value from the perspective of financing constraints. *Applied Economics*, 1–15. https://doi.org/10.1080/00036846.2023.2209309

Yang, C., Fang, Z., Song, X., & Liang, Y. (2022). The influence of digital finance based on the intermediary effect of investor confidence on organizations' financing constraints. *Frontiers in Psychology*, *13*, 933134. https://doi.org/10.3389/fpsyg.2022.933134

Yang, E., Ma, G., & Chu, J. (2014). The impact of financial constraints on firm R&D investments: Empirical evidence from China. *International Journal of Technology Management*, *65*(1/2/3/4), 172. https://doi.org/10.1504/IJTM.2014.060949

Yang, T., & Zhang, X. (2022). FinTech adoption and financial inclusion: Evidence from household consumption in China. *Journal of Banking & Finance*, *145*, 106668. https://doi.org/10.1016/j.jbankfin.2022.106668

Yang, Y., & Han, J. (2023). Digital transformation, financing constraints, and corporate environmental, social, and governance performance. *Corporate Social Responsibility and Environmental Management*, *30*(6), 3189–3202. https://doi.org/10.1002/csr.2546

Yao, Y., & Yueh, L. (2009). Law, Finance, and Economic Growth in China: An Introduction. *World Development*, *37*(4), 753–762. https://doi.org/10.1016/j.worlddev.2008.07.009

Yazar, O. H. (2015). Regulation with Chinese Characteristics: Deciphering Banking Regulation in China. *Journal of Current Chinese Affairs*, *44*(2), 135–166. https://doi.org/10.1177/186810261504400206

Yiu, D. W., Su, J., & Xu, Y. (2013). Alternative financing and private firm performance. *Asia Pacific Journal of Management*, *30*(3), 829–852. https://doi.org/10.1007/s10490-012-9303-y

Yu, C.-H., Wu, X., Zhang, D., Chen, S., & Zhao, J. (2021). Demand for green finance: Resolving financing constraints on green innovation in China. *Energy Policy*, *153*, 112255. Q1/Q2. https://doi.org/10.1016/j.enpol.2021.112255

Yu, L., Zhao, D., Xue, Z., & Gao, Y. (2020). Research on the use of digital finance and the adoption of green control techniques by family farms in China. *Technology in Society*, *62*, 101323. https://doi.org/10.1016/j.techsoc.2020.101323

Zhan, M., Li, S., & Wu, Z. (2023). Can digital finance development improve balanced regional investment allocations in developing countries? — The evidence from China. *Emerging Markets Review*, *56*, 101035. https://doi.org/10.1016/j.ememar.2023.101035

Zhang, J., Wang, L., & Wang, S. (2012). Financial development and economic growth: Recent evidence from China. *Journal of Comparative Economics*, *40*(3), 393–412. https://doi.org/10.1016/j.jce.2012.01.001

Zhang, J., Zhao, W., & Zhang, Y. (2016). Institutional Transformation and Changing Networking Patterns in China. *Management and Organization Review*, *12*(2), 303–331. https://doi.org/10.1017/mor.2015.50

Zhang, L. (2022). Bank Competition, Financing Constraints, and Enterprise Innovation Investment. *Discrete Dynamics in Nature and Society*, *2022*, 1–9. https://doi.org/10.1155/2022/7399321

Zhang, P., Wang, Y., Wang, R., & Wang, T. (2024). Digital finance and corporate innovation: Evidence from China. *Applied Economics*, *56*(5), 615–638. https://doi.org/10.1080/00036846.2023.2169242

Zhang, Q., Xu, Z., Feng, T., & Jiao, J. (2015). A dynamic stochastic frontier model to evaluate regional financial efficiency: Evidence from Chinese county-level panel data. *European Journal of Operational Research*, *241*(3), 907–916. https://doi.org/10.1016/j.ejor.2014.09.021

Zhang, W., Zhao, S., Wan, X., & Yao, Y. (2021). Study on the effect of digital economy on high-quality economic development in China. *PLOS ONE*, *16*(9), e0257365. https://doi.org/10.1371/journal.pone.0257365

Zhang, Y., Xing, C., & Wang, Y. (2020). Does green innovation mitigate financing constraints? Evidence from China's private enterprises. *Journal of Cleaner Production*, *264*, 121698. https://doi.org/10.1016/j.jclepro.2020.121698

Zhao, J., Qu, J., & Wang, L. (2023). Heterogeneous institutional investors, environmental information disclosure and debt financing pressure. *Journal of Management and Governance*, *27*(1), 253–296. https://doi.org/10.1007/s10997-021-09609-2

Zhao, T., Xiao, M., & Zhang, B. (2023). Corporate social network, ownership structure, and corporate financing constraints: Evidence from China. *International Review of Economics & Finance*, *88*, 1547–1564. https://doi.org/10.1016/j.iref.2023.07.075

Zheng, F., & Ye, F. (2013). Early Warning Model of Local Governments' Debt Risk in China Based on the Financial Perspective. *Business and Management Research*, *2*(4), p129. https://doi.org/10.5430/bmr.v2n4p129