INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN ACCOUNTING, FINANCE AND MANAGEMENT SCIENCES

OPEN ACCESS JOURNAL

Vol 14, Issue 4, (2024) E-ISSN: 2225-8329

The Moderating Role of Digital Transformation on the Relationship between CEOs' Foreign Experience and Financing Constraints of Firms in China

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To Link this Article: http://dx.doi.org/10.6007/IJARAFMS/v14-i4/23386 DOI:10.6007/IJARAFMS/v14-i4/23386

Published Online: 10 November 2024

Abstract

Given the degree and effectiveness of corporate financing are the main factors of corporate economic growth, it is crucial to examine how to alleviate financing constraints. Drawing on signaling and resource-based view theories, this study analyses how a CEO's foreign experience influences a firm's financial constraints and explores the moderating role of digital transformation in the former relationship. Using panel data from Chinese A-share companies listed on the Shenzhen and Shanghai Stock Exchanges from 2011 to 2022, the sample firms of 21,267 firm-year observations were analyzed by fixed effect regression. The result indicates a significant negative correlation between CEOs' foreign experience and financing constraints, supporting the signaling theory. The results also show that digital transformation can strengthen the relationship between CEOs' foreign experience and corporates' financial constraints through a moderating effect. This study provides an innovative perspective that enables companies to proactively address financial constraints and obtain more access to external finance. The findings are significant for promoting enterprises to cope with financing constraints.

Keywords: Financing Constraints, CEOs' Foreign Experience, Digital Transformation, Resource-Based View Theory, Signaling Theory

Introduction

As a significant economic activity for businesses, financing has long been an area of academic focus (Hadlock & Pierce, 2010; Myers & Majluf, 1984). Scholars have performed extensive theoretical and empirical research on this topic because the perfect capital market allows businesses to pursue profitable investment projects without additional costs due to the ability to raise external funds (Modigliani & Miller, 1958). Nevertheless, in reality, the inefficiencies of the capital market, for instance, monetary policy (Al-Hadi & Al-Abri, 2022), information asymmetry (Fazzari et al., 1987; Myers & Majluf, 1984), political connections (Cull et al., 2015) and agency conflict (Almeida & Wolfenzon, 2006; Bernanke & Gertler, 1986;

Gertler, 1992) will lead to the cost associated with external funding commonly higher than internal funding for an enterprise (Myers & Majluf, 1984). Ultimately, a firm's financial constraints arise (Kaplan & Zingales, 1997).

China's economy is thriving, with traditional industries undergoing urgent industrial transformation. Enterprises must increase investment in capital, technology, and talent to meet growing financing needs (Xu et al., 2023). In its role as an emerging economy, China's institutional framework is distinct from the Anglo-American framework (Komal et al., 2021). It features concentrated ownership, government intervention, limited investor protection, a fragile legal framework, and a dual-board structure. Due to the uniqueness of the institutional environment, China often faces problems of high transaction costs and limited financing channels (Liu et al., 2014).

In conclusion, given the importance of external financing, this study explores the driving factors that alleviate financing constraints from the perspective of internal corporate governance mechanisms. Sound corporate principles and good corporate governance practices significantly influence the corporation's strategic decisions, such as increasing debt financing and reducing debt financing costs, which are crucial for a company's success (Bajagai et al., 2019). Good corporate governance strategies can contribute to improving a firm's sustainability outcomes (Oh et al., 2017), and ultimately affect firms' financing.

The CEO's experience is one of the crucial factors in determining financial constraints (Jeong & Harrison, 2017; Walls & Berrone, 2017). The prior evidence indicates that chief executive officers (CEOs) have particular management styles that are absolutely essential to corporate performance (Adams et al., 2005), which may cause creditors' views regarding the future ability to repay debts (Chemmanur et al., 2010). On the one hand, their unique management styles, such as character, capabilities, qualifications, and career experience, affect the ability of enterprises to obtain financing resources and are intimately connected to financial constraints (Hu & Liu, 2015). On the other hand, CEOs can adjust their organization's actions and behaviors in a timely manner, as they have a more prominent influence in decision-making and implementation than other corporate executives (Dimaggio & Powell, 1983).

As China is implementing the "Thousand Talents Plan" to capture Chinese with international exposure to bring back and use the business ideas they acquired overseas (Yuan & Wen, 2018). The Thousand Talents Plan significantly influenced New China's economic development, with Chinese experts joining various companies and effectively implementing their economic strategies (Shahab et al., 2020). More specially, with the emergence of the "brain gain" phenomenon, being the second largest economy globally, China has appealed to a large number of returnee's talents due to its rapid economic growth and abundant job opportunities. Considering that CEOs typically exert more influence on corporate decision-making and strategy than other senior executives (Reimer et al., 2018), this research focuses on CEOs' foreign experience.

Moreover, the twenty-first century is characterized by digitization, with digital information and digital technology becoming the primary production factor. Countries like the US, Germany, and China have implemented aims to drive digital transformation, vying to

develop a digital innovation landscape (Du & Wang, 2023). Meanwhile, China's economic and societal progress focuses on sustainable economic growth during the Fourteenth Five-Year Plan and beyond, addressing socialist modernization's overall situation (Sang et al., 2024). The 'Fourteenth Five-Year Plan' aims to enhance digital advancement and establish a digital China, focusing on sustainable economic development (Du & Wang, 2023), which may have promoted corporate digital transformation implementation gradually. As China enters a "new normal" period, where promoting the restructuring and advancement of the economic framework, the progress of the digital economy has become a vital resource for China to move towards a high-quality innovative country (Zhai et al., 2022).

Generally speaking, this study investigates how the different foreign experiences of chief executive officers (CEOs) can affect finance constraints, which are moderated by digital transformation, utilizing a comprehensive database of Chinese stock market firms. This study intends to make two implications to the current literature. On the one hand, previous studies used the upper echelon theory to suggest that managers' backgrounds influence their mental frameworks and values, influencing their strategic formulation and organizational outcomes (Hambrick & Mason, 1984). In comparison, this study uses the signaling theory (Spence, 1973) to examine how CEOs can signal a positive image of the company to external investors, demonstrating how CEOs' foreign experience conveys trustworthiness and responsibility to the market. On the other hand, this study expands the existing literature on the influence of executives on financial constraints reporting by exploring the indirect link between the international experience of CEOs and financial constraints. Accordingly, this study incorporates digital transformation as a moderating factor, highlighting its role in alleviating financing constraints and enriching the literature on finance.

This study is motivated to explore this particular issue due to the reasons outlined below. For one thing, the findings of developed markets may not be straightforwardly relevant to emerging economies as a result of variations in accounting, financial, and governance standards in China (Elmagrhi et al., 2019; Shahab et al., 2018, 2019). This has potentially limited our understanding of the causes of financial constraints, justifying the need for more investigation. Hence, this study aims to analyze the effect of CEOs' foreign experience on financial constraints in the Chinese context, as existing findings might not be straightforwardly applicable to developing nations. For another thing, most existing research on the digital transformation of enterprises concentrates on the direct impact of digitization (Cui & Wang, 2023; Li & Zhou, 2024; Xue et al., 2022; Zhuo & Chen, 2023). Nevertheless, the moderating role of digitalization has not been investigated adequately. In other words, this study investigates the moderating effects of digital transformation on financial constraints, examining whether it suppresses or enhances these constraints.

As mentioned above, several gaps in research can be identified within the current literature. Consequently, this study seeks to achieve the following objectives:

- To examine whether CEOs` foreign experience affects the financial constraints of firms in China.
- To investigate whether digital transformation moderates the relationship between CEOs` foreign experience and the debt financial constraints of firms in China.

Literature Review and Hypotheses Development

The Signaling Theory

Signaling theory posits that the internal signaler has more confidential information than the external receiver (Spence, 1973). This theory is based on information asymmetry, with the receiver responding positively only if the sender is credible (Stiglitz, 2002). For listed companies, effective and reliable signals enable them to strengthen their position in the external capital market (Shapiro, 1983). The previous study has found that signal receivers respond to positive and effective signals from internal signalers to mitigate information asymmetry and agency problems among managers, and debtholders (Yasar et al., 2020), which may alleviate its creditors wary of its subsequent repayment prospects (Chemmanur et al., 2010), and thus play a critical part in financing constraints (Fazzari et al., 1988).

Consequently, signaling theory focuses primarily on the facts that signals convey positive organizational attributes and insiders' effort to convey proactive communication of positive information (Connelly et al., 2011), which plays a pivotal role in affecting corporate financial constraints (Fazzari et al., 1988). For one thing, signaling theory has a positive impact on lower financing costs, given that when a company hires prestigious top executives, the positive signal it sends reduces the capital market's uncertainty about the company's quality and financing costs in the capital market (Chen et al., 2008; Terlaak & King, 2007). For another thing, it emphasizes the need for active receivers like professional investors to constantly scan the environment for new information. They react immediately to new news and measurable responses to credible signals are significant for corporate financing constraints caused by information asymmetry (Yasar et al., 2020).

Nexus between CEOs' Foreign Experience and Financing Constraints

CEOs are pivotal members of a company's top management teams, thus playing an essential role in executing important decisions and shaping strategic goals (McGuinness et al., 2017).

Executives' overseas experience has also been recognized as a valuable signal as companies compete more fiercely in an increasingly globalized market (Morris et al., 2016). At the individual level, for one thing, returnee executives with diverse foreign experience gain international knowledge, including intercultural skills and global network information, consequently leading to more channels to ease financing constraints (Yuan & Wen, 2018).

Also, foreign experience in foreign countries enhances returnee executives' cognitive competencies, decision-making capabilities, and flexibility (Caligiuri & Tarique, 2012). CEOs with global expertise assimilate various perspectives worldwide, enhancing flexibility, receptivity, and adaptability. This allows them to approach problems from different perspectives, be inventive in shaping funding strategies, and adapt to changing financing environments effectively (Caligiuri & Tarique, 2012).

As mentioned above, CEOs with extensive overseas experience are expected to have more international knowledge and decision-making competencies (Godart et al., 2015), thereby, which could be seen as a trusted signal for the firm to engage in financing (Spence, 1974). CEOs with dynamic cross-cultural competencies are more likely to respond effectively to global challenges (Caligiuri & Tarique, 2012). Based on the signaling theory, such capability can serve as a difficult-to-replicate signal. Properly using the unique signal can attract more

financing in the international market, thereby alleviating financing constraints. In summary, combining the literature on CEOs' international experience and financial constraints, this study presents the second hypothesis below:

Hypothesis 1 (H1): CEOs' foreign experience effectively alleviates the financing constraints of Chinese firms.

The Resource-Based View Theory

The resource-based view (RBV) emphasizes a company's competitive advantage stemming from its core resources, which can be achieved through the accumulation and integration of internal resources, alongside measures for long-term competitive advantage via differentiation and protection (Wernerfelt, 1984). More specifically, the resource-based theory indicates that a corporation's internal strengths and weaknesses, rather than its external environment, influence its success or failure (Barney, 1991). This indicates that the firm's distinctive resources enhance its competitive advantage and determine performance differences among its competitors (Han & Gu, 2021). Resource heterogeneity implies that some companies are more strategically positioned to overcome financing constraints due to their access to specific resources (Peteraf & Barney, 2003). Therefore, in the market economy, companies should be viewed as proactive rather than passive organizations fulfilling shareholder mandates to settle financial constraints. The resource-based view (RBV) highlights firms are often required to use unique internal resources to receive funds from external economic entities (Han & Gu, 2021).

Moderating Role of Digital Transformation

Digital transformation could utilize digital technologies to strengthen traditional finance and enhance the efficiency of the financial system (Li, 2022). Previous research has found that digital transformation can diminish transaction costs and information asymmetry between firms and creditors, thereby enhancing internal organizational performance, and ultimately alleviating financing constraints (He et al., 2024).

To begin with, in terms of cost reduction, digital technology can reduce financing expenses. On the one hand, digital transformation can lessen the cost of market information collection and bring information transparency that lessons regulatory costs and agency costs (Chen & Xu, 2023), and thus diminish debt financing costs. On the other hand, digital transformation allows for financing connections between businesses and external financial institutions and investors to break through the limitations of time and space, improve financing efficiency, and eventually reduce transaction costs (Tilson et al., 2010).

Furthermore, digital technology, as a digital resource for enterprises, converts intricate information into a digital format for storage and transmission (Verhoef et al., 2021), thereby fully disclosing information to outside investors. These digital resources enhance investors' comprehension of the firm, thereby reducing information asymmetry between investors and companies, and improving the efficiency of information required for capital market transactions (Balakrishnan et al., 2014), which may contribute to the formation of a positive reputation and reinforce the firm's ties with financial institutions to ease financing constraints.

In terms of credit resource allocation, digital enterprises are favored by preferred by financial institutions, given that digital transformation provides the foundation for the continued operation of the enterprise (Mourtzis, 2020) and thus provides stable survival resources to attract external investment. The value of these resources is crucial for sustaining competitiveness in the digital era (Liang & Chen, 2024), making digital enterprises face smaller financing constraints. Therefore, in order to extend the existing literature and make new contributions, this study proposes its second set of hypotheses, as follows:

Hypothesis 2 (H2): Digital transformation moderates the relationship between CEOs' foreign experience and financing constraints in China.

Data and Methodology

Sample and Data Collection

The sample of this study is the China A-share listed companies for 2011–2022. This study obtained financial data from the CSMAR (China Stock Market & Accounting Research) database. Following other researchers, this study applies the following specific methods to the collected data: To begin with, this study couldn't study financial enterprises resulting from the increased variability in accounting standards and regulations compared to non-financial firms (Farooq et al., 2022), results in variability in accounting metrics. In addition, this study excludes companies with negative equity and profit margin values, and insufficient financial data from the previous three years (Farooq & Noor, 2023). What's more, this study removes the data pertaining to ST, *ST1, and other companies owing to their exceptional disruption factors to ensure the validity of the research (Zhou & Li, 2023). In other words, these companies generally lack trust in the capital market and encounter major obstacles in obtaining external market financing. As a result, they are considered an atypical sample and are excluded from the scope of the study (Xiao, 2024).

To minimize the effect of extreme data points on regression analysis results, this study winsorizes all of the continuous variables at the 1st and 99th percentiles (Zhou & Li, 2023). Eventually, this study eliminated incomplete information, leading to an unbalanced panel of 21,267 samples.

Dependent Variable

There are generally three types of approaches to quantifying enterprise financing constraints.

The first quantitative indicator is the investment cash flow sensitivity measure suggested by Fazzari (Fazzari et al., 1988), which assesses financing constraints by evaluating the sensitivity of corporate investment spending to internal cash flow. The second method is to utilize univariate indicators, such as dividend payout ratio (Datta & Rajagopalan, 1998), company size Whited (1992), and adjustment costs of fixed capital Caggese (2007) are all widely used as proxies for financing constraints. The third measurement approach involves the multivariate construction of indicators such as the KZ index (Kaplan & Zingales, 1997), SA index Hadlock & Pierce (2010), and WW index (Whited & Wu, 2006).

In contrast, the genesis of the KZ index (Kaplan & Zingales, 1997) is attributed to the research conducted by Lamont et al (2001), who estimated an ordered Logit model. The model correlates the extent of financial constraint with five readily available accounting variables: cash flow, market-to-book, leverage, dividends, and cash holdings, culminating in

the construction of the KZ index. A higher KZ index value suggests a corporate is more constrained (Farre-Mensa & Ljungqvist, 2016).

In addition, the KZ index is a reliable indicator for assessing a corporation's challenges in securing external financing, as it reflects the company's key financial conditions (Almeida & Campello, 2007). This study believes that the KZ index could more accurately represent the extent of financing constraints faced by companies in China than other indicators, which is calculated using Equation 1 following (Du & Wang, 2023).

KZ index is calculated by:

$$KZindex = -1.002 \times \frac{Cashflow}{Asset} - 39.368 \times \frac{Dividends}{Asset} - 1.315 \times \frac{Cash}{Asset} + 3.139 \times Leverage + 0.283 \times Tobin's\ Q \quad (1)$$

Independent Variables

In this study, CEOs' foreign experience (FOR) is measured as a dummy variable equal to 1 if a CEO has previously studied or worked in foreign countries and 0 otherwise, which is in line with previous studies (Shahab et al., 2020).

The Moderating Effect of Digital Transformation

This study's moderating variable is digital transformation (DT). Given that the application of digital technology serves as the basis for digital transformation within organizations. enterprises, this study uses the section related to the digital economy in the management discussion and analysis (MD&A) of the annual reports (He et al., 2024). More specifically, according to previous literature methods (Sui et al., 2024), the word frequency of digitalization indicators in the annual report as a proxy variable for the assessment of company digital transformation, including keywords "mobile Internet", "Internet of Things", "big data", "cloud computing", "artificial intelligence" (He et al., 2024). The "CSMAR" Listed Company Digital Transformation Degree database provides the word frequency. The database utilizes Python web scraping and text recognition to gather data from annual company reports, establishing an indicator system to assess digital transformation (Sui et al., 2024).

Control Variables

This study includes several control variables that influence financing constraints. Previous studies found a quadratic relationship between firm size (FSIZE), measured as a log of total assets of the firm (Amin et al., 2022), and its level of financing constraints is a significant negative relationship (Farooq & Noor, 2023). The greater a company's size, the lower its likelihood of facing financial constraints (Carpenter & Petersen, 2002). Previous studies also found a linear relationship between financing constraints and firm age (FAGE), measured as a log of the year gap between the survey since and a firm's establishment plus one (Hadlock & Pierce, 2010). In particular, age is inversely related to financial constraints because older firms face fewer financial barriers (Beck et al., 2006). Prior studies suggest that greater board size, (BODSIZE), measured as a natural log of the total number of directors on the board (Bajagai et al., 2019), is significantly associated with better corporate governance and lower level of financing constraints (Cui et al., 2023). According to Kim et al. (2023), this analysis uses the ratio of the market value of assets to total assets (TOBINQ) and the ratio of tangible assets to total assets (TANG) as the control variables, which are anticipated to show

a negative correlation with financing constraints. Moreover, prior research indicates that financing constraints are reduced in firms with superior profitability (He et al., 2024; Kim et al., 2023) and operational efficiency (Li, Wang, et al., 2023). Profitability in this study uses return on average total assets (ROA) and the ratio of earnings before interest and taxes to earnings before tax (LEV). Operational efficiency in this study uses the ratio of operating net cash flow to total assets (ONCF). Eventually, this analysis uses ownership concentration (TOP1) as a control variable (He et al., 2024), which is used to represent the ownership concentration of an enterprise, and is measured as the ratio of shares held by the top 1 largest shareholder.

Empirical Methodology

The study initially explores the influence of CEOs' foreign experience on financing constraints, using Stata 17.0 software. To ensure robustness, all continuous variables are winsorized at 1% (top and bottom) percentiles of their respective distributions. There are three most popular regression methods, namely the Common Effect Model (PLS), the Random Effects Model (REM), and the Fixed Effects Model (FEM). To identify the appropriate model of static panel data, the results of the LM test and Hausman test in this study indicate that, among the three estimation methods mentioned above, the Fixed Effects Model (FEM) produces the best outcomes, and the robust FEM is used for data analyses.

This study utilizes the Breusch-Pagan test to assess potential heteroscedasticity in the linear regression model, rejecting the null hypothesis of homoscedasticity and providing robust standard errors (Ling & Abdul Wahab, 2019).

Model 1 explains the association between CEOs' foreign experience and financing constraints. Model 2 investigates how the moderating role of digital transformation, the interaction between CEOs' foreign experience and digital transformation is included. The identical control variables are employed in both models. The baseline models are as follows:

$$FC_{it} = \alpha + \beta_1 FOR_{it} + \beta_2 \sum Controls_{it} + \varepsilon_{it} \quad (1)$$

$$FC_{it} = \alpha + \beta_1 FOR_{it} + \beta_2 DT_{it} + \beta_3 FOR_{it} \times DT_{it} + \beta_4 \sum Controls_{it} + \varepsilon_{it} \quad (2)$$

Where:

α is the constant term or intercept; β is the coefficient of the variable; ε is the random error term.

FC = Financing constraints, measured as the KZ index as shown in equation (1).

FOR = Dummy variable for CEO's foreign experience, measured as CEO has foreign experience as 1, otherwise 0.

DT = the digitalization indicator's total word frequency in the annual reports

Empirical Results and Discussion

Descriptive Statistics

Table 1(a) presents the descriptive statistics of the continuous variables. "The highest value of the dependent variable FC is positive, whereas the lowest value is negative. The mean value of the KZ index (FC) is 0.9061, and the standard deviation is 2.277, implying considerable variation among firms regarding their financing constraints. The maximum value of digital transformation (DT) is 148, and the minimum value is 0, with a mean value of 10.589, which suggests significant disparities in digitalization levels among various listed companies in China.

Additionally, the maximum value of the firm size (FSIZE) is 28.26, and the minimum value is 19.08, with a mean value of 22.39, illustrating that Chinese public enterprises exhibit significant disparities between large and small firms, which may lead them to adopt different strategies in response to financing activities. The maximum value of investment opportunities (TOBINQ) is 7.78, the minimum value is 0.85, and the mean value is 1.981, revealing that the market valuation of enterprises' assets transcends their replacement costs. The maximum value of ownership concentration (Top1) is 0.74, and the minimum value is 0.09, indicating significant variation in the shareholding levels of the first major shareholder among Chinese public companies. The mean value of 0.348 suggests that, on average, ownership concentration in China is at a relatively high level. The maximum value of ROA and ONCF is positive, whereas the minimum value is negative, indicating the financial status among listed companies shows significant differences. The highest value of the capital structure (LEV) is 7.77, and the lowest value is 0.41, indicating a significant variation in financial leverage.

Table 1(a)
Descriptive Statistics of the Continuous Variables

Variable	N	Mean	Std. Dev	Min	Max
FC	21267	0.9061	2.277	-5.90	5.90
DT	21267	10.5896	23.476	0.00	148.00
FSIZE	21267	22.3990	1.284	19.08	28.26
FAGE	21267	2.9147	0.337	1.39	3.53
BSIZE	21267	2.1329	0.195	1.61	2.71
TOBINQ	21267	1.9814	1.218	0.85	7.78
TOP1	21267	0.3483	0.147	0.09	0.74
ROA	21267	0.0533	0.043	-0.02	0.22
ONCF	21267	0.0517	0.066	-0.17	0.25
TANG	21267	0.9246	0.086	0.56	1.00
LEV	21267	1.4058	1.038	0.41	7.77

Notes: FC= Financing constraints, calculated according to Equation 1; DT= the digitalization indicator's total word frequency in the annual reports; FSIZE= Natural log of total assets; FAGE= Natural log of the year difference between the survey since and a firm's incorporation plus one; BSIZE= Natural log of the number of directors; TOBINQ= Investment opportunities, the ratio of the market value to total assets; TOP1= Ratio of shares held by the top 1 largest shareholder; ROA= Net income divided by average total assets; ONCF= Ratio of operating net cash flow to total assets; TANG = the ratio of tangible assets to total assets; LEV= the ratio of earnings before interest and taxes to earnings before tax.

Table 1(b) shows that 19260 (90.56 percent) CEOs lack foreign experience, suggesting that leaders of Chinese firms have limited access to international exposure. 2007 (9.44 percent) CEOs with foreign experience may gain access to and assimilate international expertise. The positive signal is crucial for alleviating financial constraints.

Table 1(b)
Descriptive Statistics for the Dummy Variables

VARIABLES	Number of publicly listed companies	
	Frequency of 1s	Frequency of 0s
FOR	2,007 (9.44%)	19,260 (90.56%)

Notes: FOR= CEO's foreign experience, a dummy that equals 1 if a CEO has overseas experience and 0 otherwise.

Correlation Analysis

Table 2 presents the Pearson correlation matrix of the variables. All the correlation coefficients are <0.5, which resolves the issue of multicollinearity. According to the initial hypotheses, the results indicate that digital transformation (DT) has a significant negative repercussion on financing constraints. However, further regression tests are needed to examine this relationship in greater depth.

In addition, the variables FSIZE, FAGE, and BSIZE exhibit a positive and statistically significant relationship with FC at the 1% level, revealing that the degree of financing constraints increases with firm size, firm age, and board size. There is a negative correlation between Tobin's Quotient (TOBIN's Q) and FC. There is also a significant adverse relationship between TOP1 and FC, indicating that the growth of TOP1 results in a decrease in financing constraints within the enterprise. Regarding the correlation between ROA, ONCF, and FC, there are negative linear correlations, which indicates that better financial status may help them reduce financing constraints. Additionally, the variable of TANG and LEV shows a significant positive correlation with FC.

Table 2
Pearson Correlation Matrix

	FC	DT	FSIZE	FAGE	BSIZE	TOBIN Q	TOP1	ROA	ONCF	TANG	LEV
FC	1										
DT	-0.055***	1									
FSIZE	0.163***	-0.00100	1								
FAGE	0.105***	0.017**	0.227***	1							
BSIZE	0.057***	-0.073***	0.244***	0.044***	1						
TOBINQ	-0.095***	0.101***	-0.365***	-0.055***	-0.127***	1					

TOP1	-0.060***	-0.121***	0.187***	-0.092***	0.021***	-0.106***	1			
ROA	-0.559***	0.023***	-0.079***	-0.081***	-0.045***	0.370***	0.054***	1		
ONCF	-0.575***	-0.046***	0.062***	0.041***	0.041***	0.136***	0.083***	0.435***	1	
TANG	0.032***	-0.139***	0.011*	0.00800	0.019***	-0.035***	0.113***	-0.00100	-0.044***	1
LEV	0.342***	-0.077***	0.120***	0.049***	0.078***	-0.150***	-0.037***	-0.378***	-0.109***	0.021***

Notes: ***, **, and * indicate statistical significance at 1%, 5%, and 10%; FC= Financing constraints, calculated according to Equation 1; DT= the digitalization indicator's total word frequency in the annual reports; FSIZE= Natural log of total assets; FAGE= Natural log of the year difference between the survey since and a firm's incorporation plus one; BSIZE= Natural log of the number of directors; TOBINQ= Ratio of the market value to total assets; TOP1= Ratio of shares held by the top 1 largest shareholder; ROA= Net income divided by average total assets; ONCF= Ratio of operating net cash flow to total assets; TANG = Ratio of tangible assets to total assets; LEV= Ratio of earnings before interest and taxes to earnings before tax.

Empirical Tests and Discussion of the Impact of CEOs' Foreign Experience on Financing Constraints

The results of the panel regression analyses are presented in Table 3. In Column 5, there is a significant negative relationship between CEOs' foreign experience and financing constraints at the level of 1%, with a coefficient of -0.18. This suggests that more CEOs with foreign experience are connected with lower degrees of FC, accordingly endorsing hypothesis H1, which posits that CEOs' foreign experience decreases financing constraints. In accordance with the signaling theory, CEOs' foreign experience might deliver positive signals to investors. The evidence suggests that more CEOs' overseas experience can mitigate more effectively financing constraints, which is consistent with prior research (Xia et al., 2023; Ye et al., 2023).

In terms of the moderating effect, with regard to digital transformation, Column 6 shows the interaction term between CEOs' foreign experience and digital transformation negatively influences financing constraints, indicated by a coefficient of -0.003 at a 5% significance level. The outcome suggests that digital transformations' negative moderation between CEOs' overseas experience and firms' financing constraints, implying that a higher level of digital transformation promotes the mitigating effect of CEOs' foreign experience on financing constraints. The finding provides empirical evidence to confirm hypothesis H2, highlighting that digital transformation can strengthen the influence of CEOs' overseas experience on financing constraints.

Moreover, as we reported in Table 3, every control variable is statistically significant. For example, firm size and firm age positively affect financing constraints, signifying that older

and bigger firms suffer more financing constraints, which supports the conclusions of Hadlock & Pierce (2010). Return on average total assets (ROA) and the ratio of operating net cash flow to total assets (ONCF) have negative and statistically significant effects on the firm's financing constraints at a 1% significance level, indicating that financial status acts as a restraining factor of the firm's financing constraints, which corresponds to the results of He et al. (2024).

Table 3
The effect of CEOs' foreign experience on financing constraints

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	OLS	OLS	REM	REM	FEM	FEM
FOR	**-0.195*** **	**-0.152*** **	**-0.106** **	**-0.099***	**-0.180*** **	**-0.131*** **
	(-5.597)	(-3.973)	(-2.196)	(-1.854)	(-5.257)	(-3.431)
DT		**-0.006*** **		**-0.002*** **		**-0.002*** **
		(-13.394)		(-3.222)		(-3.917)
FOR×DT		**-0.002***		-0.000		**-0.003** **
		(-1.751)		(-0.195)		(-2.564)
FSIZE	**0.462*** **	**0.469*** **	**0.435*** **	**0.440*** **	**0.409*** **	**0.412*** **
	(52.947)	(53.891)	(25.003)	(25.529)	(45.019)	(45.338)
FAGE	**0.709*** **	**0.678*** **	**1.114*** **	**1.096*** **	**0.582*** **	**0.576*** **
	(20.048)	(19.257)	(16.504)	(16.301)	(16.611)	(16.441)
BSIZE	**-0.115** **	**-0.142*** **	-0.082	-0.085	-0.079	**-0.088***
	(-2.192)	(-2.714)	(-1.041)	(-1.074)	(-1.517)	(-1.695)
TOBINQ	**0.584*** **	**0.597*** **	**0.640*** **	**0.642*** **	**0.608*** **	**0.610*** **
	(47.991)	(49.360)	(48.410)	(48.698)	(50.841)	(51.085)
TOP1	**-0.324*** **	**-0.412*** **	**-0.354*** **	**-0.387*** **	**-0.448*** **	**-0.462*** **
	(-4.704)	(-5.966)	(-2.766)	(-3.034)	(-6.502)	(-6.687)
ROA	-	-	-	-	-	-
	21.515* **	**21.566*** **	**17.853*** **	**17.928*** **	**20.914*** **	**20.935*** **
	(-62.172)	(-62.754)	(-44.140)	(-44.376)	(-60.920)	(-61.083)
ONCF	-	-	-	-	-	-
	14.654* **	**14.820*** **	**14.093*** **	**14.122*** **	**14.502*** **	**14.533*** **
	(-84.383)	(-85.491)	(-82.078)	(-82.319)	(-83.148)	(-83.386)
TANG	**-0.289** **	**-0.488*** **	**-0.975*** **	**-1.028*** **	**-0.659*** **	**-0.719*** **
	(-2.332)	(-3.931)	(-4.609)	(-4.868)	(-5.160)	(-5.607)
LEV	**0.320*** **	**0.312*** **	**0.208*** **	**0.207*** **	**0.320*** **	**0.318*** **
	(30.896)	(30.337)	(19.252)	(19.205)	(31.453)	(31.367)
Constant	**-8.822*** **	**-8.589*** **	**-8.942*** **	**-8.932*** **	**-8.779*** **	**-8.746*** **
	(-36.325)	(-35.512)	(-20.321)	(-20.463)	(-35.229)	(-35.143)
Observations	21,267	21,267	21,267	21,267	21,267	21,267
R-squared	0.61	0.62			0.63	0.63
Industry FE	NO	NO			YES	YES
Year FE	NO	NO			YES	YES

Notes: ***, **, and * indicate statistical significance at 1%, 5%, and 10%; FC= Financing constraints, calculated according to Equation 1; FOR= CEO's foreign experience, a dummy that equals 1 if a CEO has the overseas experience and 0 otherwise; DT= the digitalization indicator's total word frequency in the annual reports; FSIZE= Natural log of total assets;

FAGE= Natural log of the year difference between the survey since and a firm's incorporation plus one; BSIZE= Natural log of the number of directors; TOBINQ= Ratio of the market value to total assets; TOP1= Ratio of shares held by the top 1 largest shareholder; ROA= Net income divided by average total assets; ONCF= Ratio of operating net cash flow to total assets; TANG =Ratio of tangible assets to total assets; LEV= Ratio of earnings before interest and taxes to earnings before tax. Robust standard errors grouped at the firm level are reported in parentheses.

Robust Estimations

Previous studies suggest that financial research is susceptible to the issue of endogeneity (Larcker & Rusticus, 2010). To verify the robustness of the research findings above, this study retested them from the aspects of Alternative Independent Variable. The independent variable, FOR, is replaced by using the number of returnees in the top management teams, instead of the CEOs. TMT' foreign experience (FOR^1) is measured as a dummy variable equal to 1 if TMT members have overseas work or study experience previously and 0 otherwise (Lau et al., 2016).

Column 1 of Table 4 shows that the overseas experience of the top management teams (FOR^1) shows a negative association with financing constraints, significant at the 1% level, indicating that CEOs' foreign experience mitigates financing constraints, thus verifying hypothesis H1. Following the introduction of digital transformation as a moderating variable, Column 2 of Table 4 reveals that the interaction term between the overseas experience of the top management teams (FOR^1) and digital transformation (FOR^1 x DT) demonstrates a negative association with financing constraints, significant at the 10% level, with a coefficient of -0.105. This indicates that digital transformation may enhance the influence of CEOs' foreign experience on financing constraints, further reinforcing hypothesis H2.

Table 4
Robustness Test

	(1)	(2)
VARIABLES	FEM	FEM
FOR^1	**-0.128*****	**-0.069*****
	(-6.4736)	(-2.7851)
DT		**-0.002*****
		(-3.9537)
FOR^1 ×DT		**-0.105*****
		(-3.8355)
FSIZE	**0.415*****	**0.421*****
	(45.2392)	(45.7033)
FAGE	**0.576*****	**0.568*****
	(16.4232)	(16.2038)
BSIZE	-0.050	-0.060
	(-0.9632)	(-1.1523)
TOBINQ	**0.609*****	**0.612*****
	(50.8629)	(51.1228)
TOP1	**-0.449*****	**-0.468*****
	(-6.5117)	(-6.7766)

ROA	**-20.897*****	**-20.906*****
	(-60.9019)	(-61.0369)
ONCF	**-14.517*****	**-14.544*****
	(-83.3313)	(-83.5680)
TANG	**-0.680*****	**-0.737*****
	(-5.2973)	(-5.7217)
LEV	**0.317*****	**0.315*****
	(31.2558)	(31.1370)
Constant	**-8.891*****	**-8.893*****
	(-35.6708)	(-35.7003)
Observations	21,267	21,267
R-squared	0.631	0.632
Industry FE	YES	YES
Year FE	YES	YES

Notes: ***, **, and * indicate statistical significance at 1%, 5%, and 10%; FC= Financing constraints, calculated according to Equation 1; FOR^{1}= Overseas background of directors, supervisors, and senior executives, a dummy that equals 1 if he has the overseas experience and 0 otherwise; DT= the digitalization indicator's total word frequency in the annual reports; FSIZE= Natural log of total assets; FAGE= Natural log of the year difference between the survey since and a firm's incorporation plus one; BSIZE= Natural log of the number of directors; TOBINQ= Ratio of the market value to total assets; TOP1= Ratio of shares held by the top 1 largest shareholder; ROA= Net income divided by average total assets; ONCF= Ratio of operating net cash flow to total assets; TANG = Ratio of tangible assets to total assets; LEV= Ratio of Earnings before interest and taxes to earnings before tax. Robust standard errors grouped at the firm level are reported in parentheses.

Conclusion

This study proposes hypotheses, establishes models, and uses relevant data from Chinese listed companies from 2011 to 2022, conducting a multivariate regression empirical study, learning from signaling theory, resource-based theory, and relevant academic research. Through rigorous statistical methodologies, this study established a link between CEOs' foreign experience and financial constraints and examined the moderating impact of digital transformation on this relationship. In conclusion, the main findings of this study are summarized as follows:

Firstly, CEOs' foreign experience is negatively associated with financing constraints. As expected, returnee executives with transnational experience can recombine their international knowledge to create new insights, thereby, considering multiple solutions when solving financing decision problems. This study demonstrates the constructive influence of a CEO's foreign experience on financial constraints in corporations and realizes the crucial role of the CEO's overseas experience in alleviating Chinese firms' financing problems.

Secondly, this study broadens the prior literature by incorporating digital transformation as a moderator, proving that digital transformation can effectively intensify the inverse relationship between CEOs' foreign experience and financing constraints, which

supports digital transformation can ultimately mitigate financial constraints by decreasing financing costs and improving external financing efficiency (Du & Wang, 2023).

Thirdly, this study makes a theoretical contribution to signaling theory by offering a new integrated theoretical perspective to analyze the impacts of CEOs' foreign experience on a firm's financing strategy. This study uses signaling theory to explore that distinctions in a corporation's financing constraints may be justified by the characteristics of the management, which can be viewed as signaling credibility.

These findings contribute significantly to the new approaches for Chinese policymakers and corporations to reduce financing constraints. From one perspective, the talent shortage potentially hinders the positive effect of returnee leadership on alleviating financing constraints in the corporation. Therefore, the Chinese government should formulate consistent policies to attract overseas talents to return to China and improve the internationalization of senior corporate personnel. Chinese firms can improve their external financing capabilities by hiring more CEOs with foreign experience. In other words, Chinese companies can optimize employee benefits and compensation to attract highly skilled and knowledgeable individuals returning from studying or working overseas, returnees with rich international experience can positively contribute to corporate financing. From another perspective, Chinese firms should accelerate the digital transformation. Digital transformation as a heterogeneous resource can reduce the friction between corporates and investment markets. Therefore, it is necessary to take holistic research methods to accelerate digital transformation, as the greatest contribution of digitalization is financial cost reduction and financial boost in efficiency, and ultimately mitigate financing constraints.

Although the findings of this study are robust, its limitations must be directly stated. For instance, we have relied on secondary data for this examination. What's more, consistent with the prior research of this study, our indicators are too limited to one aspect such as overseas. Consequently, upcoming research could bolster our results by using the combined impact of CEOs' multiple backgrounds to develop a richer understanding. Likewise, our study only focuses on listed companies in China, which could arguably reduce the generalizability of our findings to other settings. Therefore, future studies may obtain a greater understanding by using a sample of companies on ChiNext (China Growth Enterprise Market) that will draw on sample companies at different stages of development.

In summary, as previously discussed, this study makes a theoretical contribution to signaling theory and the resource-based theory by offering a new comprehensive theoretical model to explore the moderating role of digital transformation on the relationship between CEO`s foreign experience and the financing constraints of firms in China. Similarly, this study practically contributes to the innovation of corporate governance mechanisms in China by demonstrating the positive effect of the CEOs` foreign experience on financial constraints. These contributions offer valuable perspectives that could inspire financing strategies to alleviate financing constraints in the special context of China.

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