

# The Impact of Digital Inclusive Finance on Corporate Risk-Taking

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**Abstract.** In the digital era, where enterprises often show limited risk-taking abilities, this study analyzes panel data from A-share listed companies in China from 2011 to 2022 to systematically explain how digital inclusive finance affects corporate risk-taking levels. The research reveals that digital inclusive finance significantly boosts corporate risk-taking. Through a detailed mechanism analysis using a mediation effect model, the study finds that digital inclusive finance enhances corporate risk-taking by easing financing constraints and promoting digital transformation. Further investigation highlights that the positive impacts of digital inclusive finance are especially evident in older and smaller enterprises. These businesses, which frequently encounter greater difficulties in accessing traditional financial resources, gain considerably from the opportunities provided by digital inclusive finance. This study offers valuable insights for improving corporate risk-taking capabilities and achieving high-quality development.

**Keywords:** Digital Inclusive Finance, Risk-Taking Level, Mechanism Analysis, High-Quality Development.

## 1. Introduction

Since the 20th National Congress of the Communist Party of China, high-quality economic development has become the new focus of the era. Digital inclusive finance, which integrates digital technologies such as big data, cloud computing, blockchain, and artificial intelligence with inclusive finance, significantly reduces the cost burden of traditional inclusive finance, broadens the reach of financial services, and improves accessibility at the individual level. In this new era, utilizing digital inclusive finance to foster high-quality development of the real economy has become a vital task.

Corporate risk-taking can drive innovation, enhance core competitiveness, improve social productivity, and foster economic growth. It is a central trait of entrepreneurial spirit and a critical factor for future growth and high-quality development [1]. However, the overall level of risk-taking among Chinese companies is relatively weak, lacking proactive risk prediction and resolution capabilities. This has become one of the obstacles hindering the competitiveness of Chinese enterprises. Digital inclusive finance provides more efficient, precise, and economic data services, enhancing companies' risk-taking abilities.

Current research on digital inclusive finance focuses on its macroeconomic effects on regions and industries, and its micro-economic effects in emerging markets. On the macro level, digital inclusive finance initially increases and then decreases the financial and income disparities between urban and rural areas. For instance, Zhao Bingqi (2020) [2] pointed out that it gradually narrows the urban-rural income gap. Tang Yong et al. (2021) [3] found that digital inclusive finance promotes rural consumption upgrades by lowering financial service thresholds and improving consumption environments. Du Jiating et al. (2022) [4] indicated that its promotion on rural consumption structure upgrades exhibits "marginally increasing" and "S-shaped" characteristics. Furthermore, it reduces the cost of accessing funds and customer information for innovators, stimulating regional technological innovation and offering new perspectives for agricultural transformation (Zhao Jinchun, 2024) [5].

On a micro level, research focuses on areas such as corporate innovation, financing constraints, and corporate performance. Fan Zhiying and Du Junping (2023) [6] discovered that digital inclusive finance enhances companies' technological innovation capabilities by raising their risk-taking levels.

Wen Xuezhou et al. (2024) [7] argued that it significantly promotes sustainable development for tech-oriented SMEs, with financing constraints serving as a mediating factor. Additionally, the development of digital inclusive finance drives commercial banks to release more credit funds to SMEs, alleviating their financing pressures. Overall, digital inclusive finance shows significant positive impacts both macro-economically and micro-economically.

Although existing literature has explored various effects of digital inclusive finance, there is limited research on its impact on corporate risk-taking, an important corporate activity. Most studies focus on commercial banks or regard risk-taking as an intermediary variable. Moreover, when studying the factors influencing corporate risk-taking, little attention is paid to digital inclusive finance as an external tool supplementing corporate governance. This is especially crucial in the era of big data, where the financial system tends toward digitization. Exploring the impact of digital inclusive finance on corporate risk-taking and their interaction mechanisms is thus essential.

This paper's marginal contributions are: First, it enriches the research on digital inclusive finance. Previous studies mainly investigated the extent of digital inclusive finance's diffusion, technological means, and policy impacts. This paper, however, analyzes how digital inclusive finance influences corporate risk-taking by improving the financing environment, reducing financing costs, and enhancing fund utilization efficiency. Second, through empirical analysis, it reveals the specific mechanisms by which digital inclusive finance affects corporate risk-taking and explores the differences in these effects across various firm sizes, ownership types, and regional economic development levels. This provides valuable references for policymakers and guidance for corporate strategic decision-making in the digital economy context. Overall, this research not only deepens the understanding of digital inclusive finance but also offers new perspectives and approaches to enhancing the competitiveness and innovation capacity of Chinese enterprises.

## **2. Theoretical analysis and hypothesis development**

### **2.1. Impact of digital inclusive finance on corporate risk-Taking**

Unlike traditional finance, digital inclusive finance relies on the Internet and big data, utilizing technologies such as information processing, data communication and artificial intelligence in the financial sector. This integration promotes information sharing and represents a deep fusion of digital technology and inclusive finance. It effectively addresses long-standing issues like "favoring the rich over the poor" and the "digital divide" in the financial field. By facilitating real-time information sharing and updates, it alleviates market information asymmetry and significantly enhances corporate risk-taking levels.

Specifically, digital technology impacts enterprises through resource support and information governance. With regards to resource support, digital inclusive finance operates on two levels. First, digital inclusive finance enables financial institutions to access detailed enterprise information through data platforms, allowing for real-time tracking and credit risk evaluation. This helps construct personalized credit assessments for enterprises[8]. It also uses data mining to identify enterprise funding needs and potential clients, improving SME financing and matching fund supply with demand[9]. Secondly, digital inclusive finance amplifies the scale of funding accessible to enterprises. By leveraging technologies like machine learning, digital inclusive finance aggregates idle funds, overcoming spatial and temporal barriers to meet diverse funding needs, thereby providing ample capital and enhancing corporate risk-taking capacity.

In terms of information governance, digital inclusive finance leverages advanced technologies like big data and cloud computing to collect, store, and analyze vast amounts of data, enabling precise monitoring and risk management of financial activities. This enhances operational efficiency and improves the ability to identify and warn about potential risks. Digital inclusive finance also integrates data from various sources through big data technologies, fostering information interconnectivity. This data-sharing mechanism helps financial institutions gain comprehensive insights into clients' credit status and risk profiles, facilitating more precise credit decision-making.

## **2.2. Alleviating Corporate Financing Constraints through Digital Inclusive Finance**

Digital inclusive finance can alleviate corporate financing constraints, thereby enhancing corporate risk-taking levels. First, by utilizing big data and artificial intelligence, digital inclusive finance significantly mitigates issues of information asymmetry. By collecting and analyzing operational data, transaction records, and credit information of enterprises, financial institutions can obtain a comprehensive credit profile of enterprises. This increased transparency allows financial institutions to assess credit risks more accurately, reducing financing barriers caused by information asymmetry [10]. Consequently, enterprises find it easier to obtain loans, which reduces financing constraints. With reduced constraints, enterprises can diversify investments, spread risks, and enhance their ability to withstand market risks.

Moreover, digital inclusive finance, with its online platforms and automated processes, lowers financing costs. Online financial services reduce manual intervention and cumbersome procedures inherent in traditional finance. Automated credit approval and risk assessment systems quickly process loan applications, reducing time and labor costs. In addition, competition on online platforms drives financial institutions to lower interest rates and fees, enabling enterprises to access funds more cheaply.

Additionally, digital inclusive finance introduces diverse financing products such as P2P lending, crowdfunding, and supply chain finance. These innovative products offer more choices, particularly for SMEs and start-ups, easing restrictions of traditional banking channels. For instance, supply chain finance, backed by the credit support of core enterprises, offers financing to upstream and downstream SMEs, lowering the bar for access to financing. Digital inclusive finance also expands the reach of financial services via mobile internet, allowing enterprises in remote or underserved areas to receive financial support. These means of inclusive finance reduce service thresholds, enabling more SMEs to obtain funds, supporting their innovation and expansion activities. This facilitates long-term planning and strategic investments, enhancing their overall risk-taking capacity.

## **2.3. Promoting Corporate Digital Transformation through Digital Inclusive Finance**

Digital inclusive finance supports digital transformation, thereby enhancing corporate risk-taking capacity. Initially, it offers convenient financial services via online platforms, such as online loans, mobile payments, and digital wallets. These services reduce the barriers to accessing financial resources, allowing enterprises quicker access to funds and facilitating digital transformation.

By leveraging big data analysis and AI technologies, digital inclusive finance assists firms in boosting information transparency and data utilization. Enterprises can use these tools for market analysis, customer behavior prediction, and risk evaluation, which optimize decision-making processes. This data-driven decision support is a key component of digital transformation. Through automation and intelligent business processes, digital transformation reduces operational costs and enhances productivity. Automation minimizes human errors and accelerates production and services, enabling companies to maintain a competitive edge in dynamic markets. This optimized cost structure strengthens companies' resilience against market fluctuations, allowing them to bear more market and innovation risks [11].

Furthermore, digital inclusive finance encourages the use of digital marketing tools and customer relationship management systems, helping firms expand their markets and customer channels. Through targeted marketing and personalized services, firms can more effectively attract and retain customers, diversify revenue streams, and reach potential customers globally, thereby increasing market share and risk-taking ability. Such market expansion potential is a critical driver of corporate digital transformation.

Based on the above theoretical analysis, this paper proposes the following hypotheses:

H1: Digital inclusive finance enhances corporate risk-taking capability.

H2: Digital inclusive finance alleviates corporate financing constraints, thus enhancing risk-taking capability.

H3: Digital inclusive finance promotes corporate digital transformation, thus enhancing risk-taking capability.

### 3. Research Design

#### 3.1. Sample Selection and Data Sources

In this study, drawing on the research by Fan Zhiying and Du Junping (2023)[6], we select China's A-share listed companies from 2011 to 2022 as our research subjects. The sample data are processed as follows: (1) Exclude data from the financial industry; (2) Exclude ST and \*ST samples (companies under special treatment due to financial issues); (3) Exclude companies with missing data. Data on digital inclusive finance indicators are sourced from the "Peking University Digital Financial Inclusion Index (2011-2022)" published by the Peking University Digital Finance Research Center, while other data are obtained from the CSMAR (China Stock Market & Accounting Research) database. To mitigate the influence of outliers on empirical results, all continuous variables undergo winsorization at the 1% and 99% levels. This process results in a final dataset comprising 34,560 sample observations.

#### 3.2. Variable Measurement

##### (1) Explanatory Variable

Digital Inclusive Finance (DIF): Referring to the research by Wang Zhuquan and Ji Dingyun (2024) [10], we measure the level of digital inclusive finance development in the province where the enterprise is located by taking the natural logarithm of the Digital Financial Inclusion Index released by the Peking University Digital Finance Research Center. This index employs a multi-level evaluation system and is regarded as highly reliable and authoritative.

##### (2) Dependent Variable

Corporate Risk-Taking (Risk): Following the methodologies of Faccio et al. (2011)[12] and Cai Yanping et al. (2024)[13], corporate risk-taking is measured by the volatility of the Return on Assets (ROA). The ROA is calculated as the ratio of Earnings Before Interest and Taxes (EBIT) to total assets at the end of the year. When measuring volatility, we also adjust for annual-industry mean, as outlined in Equation (1).

$$Adj\_ROA_{i,t} = \frac{EBIT_{i,t}}{ASSET_{i,t}} - \frac{1}{X} \sum_{i=1}^X \frac{EBIT_{i,t}}{ASSET_{i,t}} \quad (1)$$

In this context, subscript  $i$  represents the firm,  $t$  represents the year, and  $X$  indicates the number of firms in the industry. Then, using a three-year rolling period, we calculate the standard deviation of the industry-adjusted ROA for each sample firm to measure corporate risk-taking. This is detailed in Equation (2).

$$Risk_{i,t} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T \left( Adj\_ROA_{i,t} - \frac{1}{T} \sum_{t=1}^T Adj\_ROA_{i,t} \right)^2} \quad |T = 3 \quad (2)$$

##### (3) Controls Variables

Referring to the study by Zhao Xin et al. (2024) [14], this paper selects the following control variables: firm size (Size), leverage ratio (Lez), return on equity (ROE), cash flow ratio (Cashflow), firm age (Age), CEO duality (Dual), number of directors (Board), board independence (Indep), total asset turnover (ATO), and ownership nature (SOE). The analysis also controls for year and individual fixed effects. Specific variable definitions are provided in Table 1.

**Table 1.** Variable Definition

| Type                 | Name                      | Symbol     | Definition                                                                                                       |
|----------------------|---------------------------|------------|------------------------------------------------------------------------------------------------------------------|
| Explanatory Variable | Corporate Risk-taking     | Risk       | Standard deviation of return on total assets of the enterprise                                                   |
| Dependent Variable   | Digital Inclusive Finance | DIF        | Natural logarithm of the Peking University Digital Inclusive Finance Index                                       |
| Control Variables    | Firm Size                 | Size       | Natural logarithm of the firm's total assets at year-end                                                         |
|                      | Leverage Ratio            | Lez        | Ratio of total liabilities to total assets at year-end for the enterprise                                        |
|                      | Return on Equity          | ROE        | Net profit of the enterprise divided by the average balance of shareholders' equity                              |
|                      | Cash Flow Ratio           | Cashflow   | Ratio of net cash flow from operating activities to operating revenue                                            |
|                      | Firm Age                  | Age        | Natural logarithm of the company's years listed plus one                                                         |
|                      | CEO Duality               | Dual       | Assign a value of 1 if the chairman and the general manager are the same person; otherwise, assign a value of 0. |
|                      | Number of Directors       | Board      | Natural logarithm of the number of board members                                                                 |
|                      | Independence of Board     | Indep      | Number of independent directors divided by the number of board members                                           |
|                      | Total Asset Turnover      | ATO        | Operating revenue divided by the total assets at the end of the year                                             |
|                      | Ownership Nature          | SOE        | Assign a value of 1 if the enterprise is state-owned, otherwise assign a value of 0.                             |
|                      | Year                      | Year       | Annual dummy variable                                                                                            |
|                      | Individual                | Individual | Individual dummy variable                                                                                        |

### 3.3. Model Specification

#### 3.3.1. Baseline Regression Model

To examine the impact of digital inclusive finance on corporate risk-taking, the following regression model is constructed:

$$\text{Risk}_{i,t} = \beta_0 + \beta_1 \text{DIF}_{i,t} + \sum \beta_j \text{Controls}_{i,t} + u_i + \lambda_t + \varepsilon_{i,t} \quad (3)$$

In Model (3), Risk represents corporate risk-taking, DIF stands for digital inclusive finance, and Control includes the control variables involved in the regression analysis.  $\lambda_t$  and  $u_i$  represent the year fixed effects and individual fixed effects, respectively, while  $\varepsilon_{i,t}$  denotes the random disturbance term. This study primarily focuses on  $\beta_1$ ; if it is significantly greater than 0, it indicates that digital inclusive finance can increase corporate risk-taking levels, thus supporting the hypothesis of this paper.

## 4. Empirical Analysis

### 4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of the main variables. It can be observed that the maximum value of corporate risk-taking (Risk) is 0.236, the minimum value is 0, the average value is 0.031, and the standard deviation is 0.041. This indicates that there is some variation in risk-taking levels among different companies in the sample, and overall, it is relatively low. For the digital inclusive finance index (DIF), the maximum value is 4.384, the minimum value is 2.916, the average value is 3.975, and the standard deviation is 0.407. This suggests a significant disparity in the development levels of digital inclusive finance across different regions in China.

**Table 2.** Descriptive Statistics

| Variables | Ob    | Mean   | Std   | Min    | Max   |
|-----------|-------|--------|-------|--------|-------|
| Risk      | 34560 | 0.031  | 0.041 | 0      | 0.236 |
| DIF       | 34560 | 3.975  | 0.407 | 2.916  | 4.384 |
| Size      | 34560 | 22.15  | 1.307 | 19.80  | 26.25 |
| Lez       | 34560 | 0.397  | 0.205 | 0.043  | 0.876 |
| ROE       | 34560 | 0.067  | 0.132 | -0.628 | 0.376 |
| Cashflow  | 34560 | -0.116 | 0.513 | -2.971 | 0.962 |
| Age       | 34560 | 2.906  | 0.335 | 1.792  | 3.526 |
| Dual      | 34560 | 0.302  | 0.459 | 0      | 1.000 |
| Board     | 34560 | 2.116  | 0.197 | 1.609  | 2.639 |
| Indep     | 34560 | 0.377  | 0.054 | 0.333  | 0.571 |
| ATO       | 34560 | 0.145  | 0.113 | 0.008  | 0.656 |
| SOE       | 34560 | 0.322  | 0.467 | 0      | 1.000 |

#### 4.2. Baseline Regression Analysis

Table 3 presents the baseline regression results of digital inclusive finance and corporate risk-taking. In Column (1), only year fixed effects are controlled for. Column (2) builds on Column (1) by also controlling for individual fixed effects. Column (3) adds control variables to those in Column (2). The regression results from Columns (1) to (3) show that the regression coefficient of digital inclusive finance (DIF) on corporate risk-taking (Risk) is significantly positive at the 1% level. This indicates that digital inclusive finance has a significant promoting effect on corporate risk-taking, thus confirming Hypothesis 1.

**Table 3.** Baseline Regression Results

| Variables     | (1)<br>Risk          | (2)<br>Risk         | (3)<br>Risk            |
|---------------|----------------------|---------------------|------------------------|
| DIF           | 0.0018***<br>(3.55)  | 0.0167***<br>(3.23) | 0.0173***<br>(3.43)    |
| Size          |                      |                     | 0.0068***<br>(9.62)    |
| Lez           |                      |                     | 0.0065**<br>(2.54)     |
| ROE           |                      |                     | -0.0506***<br>(-15.06) |
| Cashflow      |                      |                     | 0.0005<br>(0.82)       |
| Age           |                      |                     | 0.0082**<br>(2.49)     |
| Dual          |                      |                     | -0.0004<br>(-0.55)     |
| Board         |                      |                     | 0.0065**<br>(2.51)     |
| Indep         |                      |                     | 0.0171**<br>(2.37)     |
| ATO           |                      |                     | 0.0112***<br>(3.52)    |
| SOE           |                      |                     | -0.0020<br>(-1.23)     |
| Constant      | 0.0235***<br>(11.79) | -0.0359*<br>(-1.74) | -0.2320***<br>(-8.59)  |
| Individual FE | NO                   | YES                 | YES                    |
| Year FE       | YES                  | YES                 | YES                    |
| Observations  | 34,560               | 34,560              | 34,560                 |
| R-squared     | 0.106                | 0.442               | 0.462                  |

Robust t-statistics in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

### 4.3. Robustness Checks

#### 4.3.1. Replacing the Explanatory Variables

Following the study by Li Liang and Yin Fengchun (2024) [9], this paper replaces the explanatory variables with the breadth of coverage (Coverage\_breadth) and depth of usage (Usage\_depth) of digital inclusive finance. As shown in Columns (1) and (2) of Table 4, the regression coefficient between Coverage\_breadth and Risk is 0.0122, which is significant at the 1% level. Similarly, the regression coefficient between Usage\_depth and Risk is 0.0157, also significant at the 1% level. These results are consistent with the baseline regression findings.

#### 4.3.2. Replacing the Dependent Variable

Drawing on the study by Yu Minggui et al. (2013) [15], this paper uses cash flow volatility to measure the dependent variable of corporate risk-taking (Risk1) for robustness checks. Cash flow volatility is defined as the three-year volatility of net cash flow from operating activities divided by total corporate assets, specifically the standard deviation from year  $t$  to year  $t+2$ . As shown in Column (3) of Table 4, the regression coefficient between digital inclusive finance and corporate risk-taking (Risk1) is 0.0109, which is significantly positive at the 5% level. This result is consistent with the baseline regression and further supports Hypothesis 1.

#### 4.3.3. Excluding Specific Samples

Considering that Beijing, Shanghai, Jiangsu, and Zhejiang have better economic and financial infrastructures, and their level of digital inclusive finance development far exceeds that of other regions, this paper excludes firm samples from these regions in line with the study by Zhang Liao and Liu Chengfei (2024) [11]. This is done to eliminate the interference of sample selection on empirical results by re-running the baseline regression. As shown in Column (4) of Table 4, the regression coefficient between digital inclusive finance and corporate risk-taking is 0.0257, significant at the 5% level. This indicates that after excluding specific samples, digital inclusive finance continues to have a positive effect on corporate risk-taking levels, demonstrating the robustness of the results.

**Table 4.** Robustness Check Results

| Variables        | Replacing the Explanatory Variables |            | Replacing the Dependent Variable | Excluding Specific Samples |
|------------------|-------------------------------------|------------|----------------------------------|----------------------------|
|                  | (1) Risk                            | (2) Risk   | (3) Risk1                        | (4) Risk                   |
| Coverage_breadth | 0.0122***                           | /          | /                                | /                          |
|                  | (3.36)                              | /          | /                                | /                          |
| Usage_depth      | /                                   | 0.0157***  | /                                | /                          |
|                  | /                                   | (2.65)     | /                                | /                          |
| DIF              | /                                   | /          | 0.0109**                         | 0.0257**                   |
|                  | /                                   | /          | (2.41)                           | (2.32)                     |
| Constant         | -0.2785***                          | -0.2526*** | 0.0506**                         | -0.3235***                 |
|                  | (-10.38)                            | (-7.56)    | (2.15)                           | (-6.70)                    |
| Controls         | YES                                 | YES        | YES                              | YES                        |
| Individual FE    | YES                                 | YES        | YES                              | YES                        |
| Year FE          | YES                                 | YES        | YES                              | YES                        |
| Observations     | 34,560                              | 34,560     | 34,560                           | 20,639                     |
| R-squared        | 0.445                               | 0.429      | 0.493                            | 0.442                      |

#### 4.3.4. Addressing Endogeneity Issues

##### (1) Propensity Score Matching (PSM)

To reduce bias arising from sample self-selection, this paper employs the propensity score matching method. It categorizes observations with a digital inclusive finance index above the median as the treatment group, assigning them a value of 1, while the rest are assigned to the control group with a value of 0. The remaining control variables are used as matching variables. Regressions are performed using 1:2 and 1:3 nearest neighbor matching, and all matching variables passed the balance test. As shown in Columns (1) and (2) of Table 5, when 1:2 nearest neighbor matching is used, the regression coefficient between digital inclusive finance and corporate risk-taking is 0.015, significant at the 1% level. When 1:3 nearest neighbor matching is applied, the coefficient is 0.0278, also significantly positive at the 1% level.

##### (2) Instrumental Variable Method

To further address omitted variable bias and bidirectional causality issues, this study uses the instrumental variable method for endogeneity testing. Drawing on the study by Tian Lin and Guo Mengqi (2024) [16], the internet penetration rate (NP) of each province is selected as an instrumental variable. On one hand, internet penetration is correlated with the development of digital inclusive finance since it may affect the promotion and use of digital inclusive finance. On the other hand, after controlling for variables related to corporate risk-taking, there is no direct influence path between internet penetration and corporate risk-taking, thus satisfying the exogeneity requirement. Columns (3) and (4) of Table 5 report the results of the instrumental variable method. First, using internet penetration (NP) as the instrumental variable in the first-stage regression, Column (3) shows that NP and digital inclusive finance are significantly positively correlated at the 1% level. In the second-stage regression, Column (4) indicates that the regression coefficient between digital inclusive finance and corporate risk-taking is significantly positive at the 5% level. Therefore, after addressing some endogeneity issues, digital inclusive finance still has a positive effect on corporate risk-taking.

**Table 5.** Endogeneity Test Results

| Variables     | (1)<br>Risk           | (2)<br>Risk           | (3)<br>DIF                   | (4)<br>Risk          |
|---------------|-----------------------|-----------------------|------------------------------|----------------------|
|               | PSM                   |                       | Instrumental Variable Method |                      |
|               | 1:2                   | 1:3                   |                              |                      |
| DIF           | 0.0150***<br>(2.60)   | 0.0278***<br>(3.63)   | /                            | 0.0031**<br>(2.55)   |
| NP            | /                     | /                     | 0.0253***<br>(120.54)        | /                    |
| Constant      | -0.2034***<br>(-6.92) | -0.2741***<br>(-7.34) | 2.8847***<br>(43.27)         | 0.1052***<br>(10.05) |
| Controls      | YES                   | YES                   | YES                          | YES                  |
| Individual FE | YES                   | YES                   | YES                          | YES                  |
| Year FE       | YES                   | YES                   | YES                          | YES                  |
| Observations  | 26,783                | 30,626                | 34,560                       | 34,560               |
| R-squared     | 0.481                 | 0.442                 | /                            | 0.024                |

## 5. Further Analysis

### 5.1. Heterogeneity Analysis

#### 5.1.1. Heterogeneity Based on Company Age

In this analysis, companies are divided into two groups based on the median company age: longer-established and shorter-established companies. Separate baseline regressions of digital inclusive finance on corporate risk-taking are conducted, with results shown in Columns (1) and (2) of Table 6. For longer-established companies, the regression coefficient of digital inclusive finance is 0.0209, which is significant at the 1% level. In contrast, the regression coefficient for shorter-established companies is not significant. This indicates that digital inclusive finance is more effective in enhancing the risk-taking level of longer-established firms. One possible reason is that these companies typically have accumulated richer credit records and operational data. Digital inclusive finance, using big data analytics and machine learning, can more effectively assess the credit risk of these companies, offering more tailored financial products and services to help them undertake more risk boldly. On the other hand, many shorter-established companies are still exploring and validating their business models and have not reached a stage of stable profitability. Although digital inclusive finance can provide some support, it is not sufficient to significantly enhance their risk-taking levels.

#### 5.1.2. Heterogeneity Based on Company Size

Following the study by Chen Li, Zhang Huilin, and Xie Jiazhi (2024) [17], the sample is divided into large and small-sized companies based on the median company size. The impact of digital inclusive finance on corporate risk-taking is then examined for each group, with results presented in Columns (3) and (4) of Table 6. In the small-sized company group, the regression coefficient of digital inclusive finance on corporate risk-taking is significantly positive at the 1% level, whereas, in the large-sized company group, the coefficient is not significant. This suggests that digital inclusive finance has a more pronounced positive impact on the risk-taking of small-sized companies. A possible explanation is that small-sized companies are often more likely to be excluded by traditional financial institutions due to issues such as incomplete information disclosure and higher credit risk. Digital inclusive finance, characterized by its inclusiveness and grassroots nature, can effectively address the deficiencies of traditional finance by extending services to underserved small-sized companies and other long-tail groups. As a result, the introduction of digital inclusive finance significantly enhances the risk-taking capability of small-sized firms by directly alleviating their challenges related to difficult and costly financing.

**Table 6.** Heterogeneity Test Results

| Variable      | Risk               | Risk                | Risk        | Risk        |
|---------------|--------------------|---------------------|-------------|-------------|
|               | longer-established | shorter-established | Large-sized | Small-sized |
|               | (1)                | (2)                 | (3)         | (4)         |
| Variables     | Risk               | Risk                | Risk        | Risk        |
| DIF           | 0.0209***          | 0.0139              | -0.0008     | 0.0258***   |
|               | (2.62)             | (1.60)              | (-0.15)     | (2.83)      |
| Constant      | -0.1923***         | -0.2270***          | -0.1526***  | -0.3950***  |
|               | (-2.78)            | (-4.75)             | (-4.43)     | (-7.78)     |
| Control       | YES                | YES                 | YES         | YES         |
| Individual FE | YES                | YES                 | YES         | YES         |
| Year FE       | YES                | YES                 | YES         | YES         |
| Observations  | 16,171             | 17,763              | 17,067      | 17,067      |
| R-squared     | 0.530              | 0.510               | 0.527       | 0.514       |

## 5.2. Mechanism Analysis

### 5.2.1. Financing Constraints

Digital technology plays a critical role in collecting, processing, and analyzing large volumes of corporate data, addressing the issue of information asymmetry. This improved data availability allows for more accurate risk assessments, reducing lending risks and making financial institutions more willing to provide loans, thus easing the financing difficulties faced by firms. Additionally, the use of online platforms for loan applications, approvals, and disbursements simplifies business processes and reduces the costs of financial services. These cost savings facilitate the availability of more affordable credit products, enabling companies to access financing at lower interest rates and consequently alleviating financing constraints. When firms are no longer constrained by financing limitations, management may become more confident about the company's future development, leading to a greater willingness to engage in strategic risk investments, thus enhancing corporate risk-taking levels. The SA index is used to measure the degree of financing constraints experienced by enterprises. As shown in Column (1) of Table 7, the regression coefficient between digital inclusive finance (DIF) and financing constraints (SA) is 0.0321, which is significantly positive at the 1% level. This indicates that digital inclusive finance can improve corporate risk-taking by alleviating financing constraints, thereby validating Hypothesis 2.

### 5.2.2. Digital Transformation

Digital inclusive finance represents a technological innovation that encourages companies to adopt new fintech solutions, thereby spurring overall technological advancements and digital transformation. Moreover, these digital inclusive finance platforms often provide financial education and training resources, aiding businesses and their employees in improving their understanding and utilization of digital financial tools and technologies. This dissemination of knowledge facilitates a smoother digital transformation process for companies. Through digital transformation, companies can collect and analyze large datasets, enhancing their capacity to comprehend market trends, customer requirements, and competitive dynamics. This data-driven decision-making capability enables companies to evaluate risks and opportunities more accurately, allowing them to undertake risks with greater confidence. The degree of digital transformation is quantified by taking the natural logarithm of the sum of a company's digital transformation frequency indicators plus one. Column (2) of Table 7 presents the regression results of digital inclusive finance on enterprise digital transformation. The findings reveal that the regression coefficient is significantly positive at the 1% level, indicating that digital inclusive finance bolsters corporate risk-taking by accelerating digital transformation, thus confirming Hypothesis 3.

**Table 7. Mechanism Test Results**

|               | (1)        | (2)        |
|---------------|------------|------------|
| Variables     | SA         | DT         |
| DIF           | 0.0321***  | 0.0413***  |
|               | (3.14)     | (2.89)     |
| Constant      | -3.3841*** | -1.7603*** |
|               | (-54.24)   | (-14.49)   |
| Control       | YES        | YES        |
| Individual FE | YES        | YES        |
| Year FE       | YES        | YES        |
| Observations  | 34,532     | 34,536     |
| R-squared     | 0.966      | 0.767      |

## 6. Conclusions

Based on the reality of insufficient willingness for corporate risk-taking and the vigorous promotion of digital inclusive finance in China, this study systematically examines the relationship between digital inclusive finance and corporate risk-taking levels, using a sample of A-share listed companies from 2011 to 2022. The main conclusions are as follows: (1) Digital inclusive finance significantly enhances corporate risk-taking levels. This baseline conclusion is still robust after overcoming endogeneity issues and conducting robustness checks, such as substituting the explained and explanatory variables and excluding specific samples. (2) From the results of heterogeneity tests, we can see that digital inclusive finance more effectively promotes the risk-taking levels of longer-established and smaller-sized companies. (3) The alleviation of financing constraints and the promotion of digital transformation are important transmission mechanisms through which digital inclusive finance affects corporate risk-taking levels.

Based on the research findings mentioned above, the following recommendations are suggested

Firstly, at the national level, the government should develop and enhance policies and regulations to promote the growth of digital inclusive finance while ensuring robust oversight to maintain the security and stability of financial services. Additionally, increasing investment in digital infrastructure is crucial to improve network coverage and data processing capabilities, thereby providing a strong technical foundation for the expansion of digital financial services. Moreover, the government should actively engage in widespread financial literacy initiatives to enhance corporate managers' understanding and use of digital financial tools.

Secondly, financial institutions should create a variety of digital financial products to cater to the diverse needs of businesses at different development stages. Beyond being product providers, they should also collaborate with technology companies to use big data and AI technologies to boost the efficiency and precision of financial services. In particular, for smaller and older businesses, financial institutions should offer more customized financial solutions to help these companies overcome funding limitations and enhance their risk-taking abilities.

Lastly, companies should actively seek digital transformation and upgrade their information systems to better leverage digital financial services. Simultaneously, they should refine their internal financial management systems to improve capital efficiency, increase financial transparency, and enhance credit ratings. Business leaders should nurture a culture of innovation and risk-taking within the organization to adapt to the rapidly evolving market landscape. Additionally, companies should focus on utilizing digital methods to lower financing costs and facilitate easier access to capital, thus supporting their long-term strategic investments and innovation endeavors.

Through these multi-level initiatives, digital inclusive finance can effectively empower businesses and enhance their risk-taking capabilities.

## References

- [1] Yu Nutao, Zhang Huayu, Zhao Liping. Threat of Large Shareholder Exit and Corporate Risk-Taking: Avoiding Loss or Seeking Opportunity? [J]. *Journal of Applied Statistics and Management*, 2023, 42 (5): 916-936.
- [2] Zhao Bingqi. Digital Inclusive Finance in China and Urban-Rural Income Gap—An Empirical Study Based on Panel Threshold Model [J]. *Journal of Social Sciences*, 2020, 0 (1): 196-205.
- [3] Tang Yong, Lü Taiseng, Hou Jingyuan. Digital Inclusive Finance and Consumption Upgrade of Rural Residents [J]. *Wuhan Finance*, 2021 (7): 18-26.
- [4] Du Jiating, He Yong, Gu Qiannong. Nonlinear Impact of Digital Inclusive Finance on the Consumption Structure Upgrade of Rural Residents [J]. *Statistics and Information Forum*, 2022, 37 (9): 63-74.
- [5] Zhao Jinchun. Can Digital Inclusive Finance Enhance Agricultural Total Factor Productivity?—Empirical Evidence Based on Cross-Country Panel Data [J]. *Modern Economic Research*, 2024 (3): 109-121.
- [6] Fan Zhiying, Du Junping. Digital Inclusive Finance, Risk-Taking, and Technological Innovation [J]. *China Certified Public Accountant*, 2023 (3): 57-61.

- [7] Wen Xuezhou, Wang Jingjing, Yu Yuanyuan. Digital Inclusive Finance, Financing Constraints, and Corporate Sustainable Development Performance [J]. *Statistics and Decision*, 2024, 40 (8): 168-173.
- [8] Wei Mengjie, Li Jingping. Impact of Digital Inclusive Finance on Commercial Bank Credit Risk—A Joint Perspective Based on Deposit and Loan Structure [J]. *Economic Issues*, 2024 (2): 32-40.
- [9] Li Liang, Yin Fengchun. Digital Inclusive Finance, Financing Constraints, and Investment Efficiency of SMEs [J]. *Scientific Management Research*, 2024, 42 (1): 106-114.
- [10] Wang Zhuquan, Ji Dingyun. Can Digital Inclusive Finance Reduce Financial Risk for SMEs—From the Perspective of Information Disclosure and Innovation-Driven [J]. *Finance and Accounting Monthly*, 2024, 45 (6): 36-42.
- [11] Zhang Liao, Zeng Jiacheng. Digital Transformation, Peer Effects, and Corporate Risk-Taking [J]. *Business Research*, 2024 (3): 113-124.
- [12] Faccio M, Marchica M T, Mura R. Large Shareholder Diversification and Corporate Risk-Taking [J]. *The Review of Financial Studies*, 2011, 24 (11): 3601-3641.
- [13] Cai Yanping, Zhu Xuetian. Research on the Impact of Big Data Tax Administration on Corporate Risk-Taking [J]. *Journal of Hunan University (Social Science Edition)*, 2024, 38 (3): 64-73.
- [14] Zhao Xin, Li Yanan, Ding Lili. The Impact of Strong Financial Regulation on Corporate Risk-Taking—Empirical Evidence from New Asset Management Regulations [J]. *Economy and Management*, 2024, 38 (1): 1-8.
- [15] Yu Minggui, Li Wengui, Pan Hongbo. Managerial Overconfidence and Corporate Risk-Taking [J]. *Journal of Financial Research*, 2013 (1): 149-163.
- [16] Tian Lin, Guo Mengqi. Research on the Alleviation of Financing Constraints by the Development of Digital Inclusive Finance—Empirical Analysis Based on Agricultural Enterprises [J]. *Journal of Chongqing University (Social Science Edition)*, 2024, 30 (3): 70-85.
- [17] Chen Li, Zhang Huilin, Xie Jiazhi. Digital Inclusive Finance and Innovation in Private Enterprises [J]. *Finance and Trade Research*, 2024, 35 (5): 101-110.