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# Research on the Role of Digital Finance in Alleviating Financing Constraints for Small and Medium-sized Enterprises

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## Abstract

**With the rise of digital technology, digital finance has emerged and played a significant role in inclusive value. It can effectively solve the phenomenon of information asymmetry, meet the personalized financing needs of "long tail" enterprises, and reduce the financing costs of small and medium-sized enterprises. To address this situation, this article explores how digital inclusive finance can alleviate the financing pressure on small and medium-sized enterprises. We first reviewed and analyzed the academic literature and current situation related to financing for small and medium-sized enterprises and digital inclusive finance, in order to provide scientific data and conceptual sources for further in-depth analysis. Then, the feasibility of digital finance in alleviating the financing difficulties of small and medium-sized enterprises was analyzed in depth, and empirical verification was conducted using a total of 24532 actual data samples, including listed companies on the New Third Board and the Peking University Digital Inclusive Finance Index (2012-2022). Finally, we conducted a robustness test and the results showed that the research conclusions were reliable, which helps to promote further development in this field of research.**

## Keywords

**Digital Inclusive Finance; Small and Medium-sized Enterprises; Financing Constraints.**

## 1. Introduction

In the severe environment of China's economic restructuring, the COVID-19, and global political turmoil, it is an inevitable choice to comprehensively build a dual cycle development model at home and abroad to promote high-quality economic development. As an important support for China's economic growth, small and medium-sized enterprises contribute up to 80% of the country's employment opportunities, 70% of patent applications, 60% of GDP, and 50% of fiscal revenue. They are an indispensable force in strengthening domestic demand and promoting high-quality economic development. For example, the promulgation of the Small and Medium sized Enterprise Promotion Law of the People's Republic of China in 2002 and its revision in 2017 have effectively ensured the healthy development of small and medium-sized enterprises. Unfortunately, although small and micro enterprises account for 98.7% of the total number of small and medium-sized enterprises, most of them are still in their early stages and have not been able to grow into medium-sized enterprises, presenting a phenomenon known as the disappearance of medium-sized enterprises. In addition, compared to the average lifespan of small and medium-sized enterprises in countries such as the United States and Japan, which can last for 8 to 12 years, China's small and medium-sized enterprises can only maintain a lifespan of about three years. How to achieve sustainable development of small and medium-sized enterprises has become an unavoidable issue. According to data from the Research Center of the State Council, over 70% of small and medium-sized enterprises are severely hindered in their development due to financing difficulties, which constitute the main bottleneck restricting their development. In addition, the "2019-2020 Small and Micro Financing Status Report" released by the All China Federation of Industry and Commerce shows that due to the impact

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of the epidemic, 20.5% of small and micro enterprises are facing financial difficulties, of which 96% of the surveyed enterprises have not reached the level of 1 million yuan in financing needs; However, according to data from the central bank in 2018, commercial banks only provided 2% of all loans to single households with inclusive small and micro loans of less than 5 million RMB. Obviously, there has been a widespread "McMillan gap" in China for a long time, where financial resources cannot fully correspond to the economic contributions of small and medium-sized enterprises, resulting in significant deviations from actual demand.

Faced with this situation, digital finance, as an emerging form of finance, has opened up a new path for solving the financing difficulties of small and medium-sized enterprises. Compared with the previous "Internet finance" and "Fin Tech", digital finance covers a wider range, and is a new financing model that involves traditional financial institutions, Fin Tech companies and other entities, and provides financial services for financing enterprises by digital means. At present, China has become a leading indicator for the development of global digital finance, providing new opportunities for solving the financing difficulties of small and medium-sized enterprises in China.

In this context, this article takes digital finance as the perspective to empirically test the effectiveness of digital finance in breaking the financing constraints of small and medium-sized enterprises. Based on this, it further explores the differences in the relief effects of digital finance on financing constraints of different types of small and medium-sized enterprises, in order to provide certain reference opinions from government decision-making, enterprise financing, and financial development, and achieve the vision of digital finance continuing to serve small and medium-sized enterprises.

## 2. Literature Review

As the rotating chair of the G20, China has become the flagship of leading digital finance. Many similar concepts emerged at the historic moment. Huang Yiping et al. (2018)[1], through analyzing the above concepts, believed that compared with Internet finance, digital finance covers a wider range and reflects obvious advantages in inclusive value. In fact, digital finance and digital inclusive finance are almost the same in concept.

The academic research on financing constraints can be traced back to 1931, when the Financial Industry Commission in the UK found that small and medium-sized enterprises faced many difficulties in obtaining long-term funding, despite the guarantee measures, which were still referred to as the "McMillan gap". Since then, many scholars have conducted theoretical discussions on this topic, such as Modigliani and Miller (1958)[2] advocating that in an ideal market environment, there is no heterogeneity in internal and external financing of enterprises, that is, there are no financing constraints; However, due to the problem of information asymmetry, it is difficult for enterprises in actual society to achieve this ideal state of financing. Therefore, scholars have gradually realized that financing constraints refer to the difficult situation faced by enterprises when they face investment opportunities but need external financing due to insufficient own funds. This situation is particularly evident in small and medium-sized enterprises.

The factors that lead to financing constraints for small and medium-sized enterprises include multiple internal and external factors. From the perspective of internal enterprises, many scholars point out that problems such as short production cycles, poor sustained operational capabilities, and chaotic capital markets make it difficult for small and medium-sized enterprises to obtain financing; Li Mengqiong et al. (2016)[3] pointed out that the low credit rating commonly found in small and medium-sized enterprises is also a financing obstacle. Some scholars have explored from the perspective of external environment, such as Wu Xiaojun (2013)[4] emphasizing that the inadequacy of the financial system is an important reason for

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financing difficulties. Wang Xintong (2019)[5]added that banks pay too much attention to high-quality customers, which leads to credit constraints for small and medium-sized enterprises.

With the increasingly close integration of information technology and the economic field, many experts and scholars have analyzed the digital financial means to solve the financing constraints of small and medium-sized enterprises from different levels. After conducting a survey of 1617 small and medium-sized enterprises, Kaaetal (2020) [6]found that financial technology can help improve the efficiency of small and medium-sized enterprises. Unfortunately, due to the difficulty in accumulating data in the early stages of digital finance, there have been few quantitative research results in recent times. For example, Wan Jiayu (2020) [7]conducted empirical analysis using the Peking University Digital Inclusive Finance Index, confirming the significant role of digital finance in alleviating financing constraints.

Since the release of the Peking University Digital Inclusive Finance Index in 2016, the number of people empirically testing the impact of digital finance on the real economy has been increasing, and corresponding empirical clues still need to be gradually enriched and improved. Especially in the current era of the prevalence of digital finance and the outbreak of public health emergencies, it is particularly necessary to explore whether digital finance can continuously alleviate the financing constraints of small and medium-sized enterprises.

## 3. Analysis of the Current Situation

### 3.1. Current Development Status of Digital Finance

#### 3.1.1. Digital Finance Presents a Diversified New Ecological Structure

Thanks to the rapid development of digital technologies such as big data, cloud computing, artificial intelligence, and block chain in China, digital finance has become a global leader. The concept of "digital inclusive finance" advocated by the G20 Hangzhou Summit has become the leading trend in digital finance in various countries; Ant Financial, JD.com, Lufax, and Zhongan Insurance from China are among the top five large digital financial companies in the world; In emerging business areas such as third-party payments and digital currencies, China has also shown astonishing growth in influence. The new ecological structure presented by the deep integration of digital technology and the financial industry in China has made the participants of digital finance no longer limited to traditional financial institutions, but more technology enterprises such as e-commerce platforms have joined; The service types cover the evolution of traditional online businesses such as insurance and wealth management, as well as new forms such as online insurance and wealth management, as well as innovative businesses such as third-party payments and monetary funds. Meanwhile, represented by consumer credit tools such as "Huabei" and "JD Baitiao", digital finance meets the diverse financial needs of "small and micro" consumers; P2P and supply chain finance have also expanded the financing channels for small and medium-sized enterprises, achieving financial inclusiveness. In the face of increasingly prominent regulatory issues in its development process, it is necessary to reform and adjust the existing regulatory system in a timely manner to avoid the emergence of systemic risks.

#### 3.1.2. Regional Differences in Digital Finance are Still Significant

To evaluate the overall development level of digital finance in China, since 2016, the Peking University Digital Inclusive Finance Index jointly developed by the Peking University Digital Finance Research Center and Ant Group Research Institute has provided important reference materials for the academic community. The index mainly includes three first level indicators, namely, coverage, depth of use, and degree of digitalization. It comprehensively understands the development of digital finance by analyzing the use of Alipay account, the actual development of digital finance business, and the development level of digital financial services.

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The latest results show that there are significant regional differences in digital finance in China. In horizontal comparison, the overall digital financial index or its coverage, depth of use and degree of digitalization show distinctive regional characteristics, that is, the comprehensive scores of Shanghai, Zhejiang, Jiangsu and other regions along the Yangtze River and the Bohai Sea Economic Belt, as well as important cities such as Beijing Tianjin Tang, are far higher than those of Xizang, Ningxia, Xinjiang, Gansu, Qinghai and other regions in the northwest; Shanghai is in an absolute leading position, with its index nearly 1.5 times higher than the lowest in Qinghai. Vertical comparison shows that the ratio of the maximum to minimum values of the three indicators of digitization degree, coverage breadth, and usage depth is approximately 1.24, 1.37, and 1.89, respectively. Further highlighting the regional characteristics of digital finance, this difference is more pronounced in terms of usage depth. The regionalization characteristics of digital finance reflect a clear correlation between digital finance and the level of regional economic development.

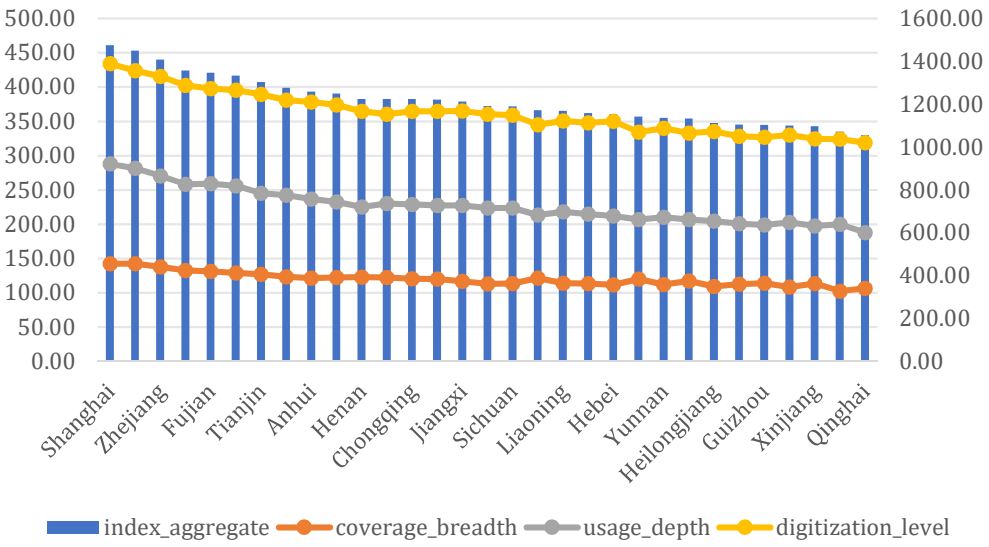


**Figure 1.** Digital Inclusive Finance Index of Various Provinces in China in 2022

## 3.2. Current Situation of Financing for Small and Medium-sized Enterprises in China

### 3.2.1. There is a Real Contradiction between the Long-term Financing Difficulties of Small and Medium-sized Enterprises and Their Economic Contribution

A survey conducted in 2002 revealed that nearly 80% of small and medium-sized enterprises were unable to meet the financing needs for their operations within one year, and over 60% were unable to obtain loans for one to three years at all. Even among companies that have successfully obtained loans, over 80% of them still indicate insufficient satisfaction, and credit difficulties constitute financial difficulties. By the end of 2017, fifteen years later, China's banking industry's total loans to small and micro enterprises accounted for only 37.8% of the total industry loans. The credit problem has not been effectively solved, and the sustainable development problem of small and medium-sized enterprises remains severe. Data shows that the average survival cycle of small and medium-sized enterprises in China was only three years in 2018, compared to 5 years and 9 years for small and medium-sized enterprises in the United States and Japan, respectively. However, it is worth noting that despite facing financial difficulties, by the end of 2022, the total number of small and medium-sized enterprises in China had reached 52 million, an increase of 51% compared to 2018. The daily number of newly added enterprises reached 23800, which is 1.3 times that of 2018. This large and dynamic group

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of enterprises has become an important pillar of the Chinese economy. The huge gap between this phenomenon and the economic responsibilities undertaken by small and medium-sized enterprises undoubtedly reflects their financing difficulties.

#### 3.2.2. Traditional Financing Channels are Difficult to Meet the Financing Needs of Small and Medium-sized Enterprises

Enterprise financing can be divided into internal financing and external financing according to different financing channels. External financing can be further divided into indirect financing with intermediary participation and direct financing as opposed, based on whether the fund supplier has intermediary participation in the financing process. In terms of enterprise scale, firstly, compared to large enterprises, the proportion of loans from banks and other financial institutions, private financing, and internal financing methods for small and medium-sized enterprises is significantly higher than that of large enterprises, while stock and bond financing is much lower than that of large enterprises; Secondly, in terms of small and medium-sized enterprises themselves, loans from banks and other financial institutions account for about 91% of the funding source, making them the most important source of funds for small and medium-sized enterprises. Mainly reflected in the difficulty of bank loan channels mainly relying on mortgage to meet the financing needs of small and medium-sized enterprises, and the high threshold for stock financing making small and medium-sized enterprises hesitant.

## 4. Empirical Research Design

### 4.1. Sample Selection and Data Sources

According to the actual situation of China's capital market, enterprises listed on the New Third Board are more representative of small and medium-sized enterprises. Considering that the New Third Board was only officially registered and established in September 2012, this article takes the companies on the New Third Board from 2012 to 2022 as the research sample. After excluding financial, ST, and * ST companies, continuous variables were subjected to Winsorization at the 1% and 99% percentiles, resulting in 24532 sample observations for the double difference model. Furthermore, it is proposed to exclude the sample of companies with missing main data such as the Digital Inclusive Finance Index, and to obtain 17827 sample observations for the fixed effects model.

Enterprise financial data and macro level data are sourced from the Wind database, while the Digital Inclusive Finance Index is sourced from the China Digital Inclusive Finance Development Index (2011-2022) developed by Peking University.

### 4.2. Variable Setting

#### 4.2.1. Dependent Variable

According to a review of relevant literature, the current methods for measuring corporate financing constraints include: quantitative models, investment cash flow sensitivity models, and cash cash cash flow sensitivity models; The second is financing constraint index, such as KZ index, SA index, WW index, etc. This article draws on the SA index designed by Hadlock et al. (2010) to measure the financing constraints of enterprises:

$$SA=0.043xSize2-0.737xSize-0.040xAge \quad (1)$$

Among them, Size is the natural logarithm of the total asset size of the enterprise; Age is the operating year of the enterprise, with a value ranging from the observation year to the establishment year of the enterprise. The larger the value of SA, the stronger the financing constraints faced by the enterprise.

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### 4.2.2. Explanatory Variables

This paper refers to the "Peking University Digital Inclusive Finance Index (2011-2022)" compiled by a research group jointly established by the Peking University Digital Finance Research Center and Ant Financial. Based on the provincial index, digital inclusive finance is analyzed as the main evaluation indicator. To avoid the problem of excessively large index values, this study divided them by 100 for evaluation. In addition, to further explore the specific impact of digital inclusive finance on the financing of small and medium-sized enterprises, we divided digital inclusive finance into three dimensions based on the above index - coverage, depth of use, and degree of digitization, and compared its impact and differences on the financing environment of enterprises. Based on the research literature of Ma Yingchao et al. (2022), this article selects the following three control variables for constraints: working capital ratio (WC), total asset net profit margin (ROA), and goods turnover rate (Turn). For detailed information, please refer to Table 1.

**Table 1.** Variable Description

| Variable classification | Variable definition | Variable symbol | Calculation method |
|---|---|---|---|
| Dependent variable | Financing constraints | SA | =-0.737 * Ran of total assets Logarithmic+0.043 * Square of natural logarithm of total assets -0.04 * Age |
| Explanatory variables | Digital Inclusive Finance Index | DIFI | Peking University Digital Inclusive Finance Index (2012-2022)/100 |
| | Coverage | COV | |
| | Use depth | USAGE | |
| | Digitization level | DIGI | |
| Control variables | Working capital ratio | WC | (Current Assets - Current Liabilities)/Total Assets |
| | Net profit margin of total assets | ROA | Net profit/average total assets |
| | Inventory turnover rate | TURN | Operating costs/average inventory |

## 4.3. Model Design

Given that there may be differences in the impact of digital inclusive finance on the financing constraints of small and medium-sized enterprises across regions, in order to avoid potential endogeneity issues caused by missing unobserved variables at the city level, we propose a fixed effects model or a random effects model to analyze and study. According to the Hausman test results (p-value of 0.02), with a significance level exceeding 5%, we explicitly rejected the hypothesis implicit in the random effects model and ultimately chose to establish a fixed effects model:

$$SA_{i,t} = \beta_0 + \beta_1 DIFI_{i,t} + \beta_2 WC_{i,t} + \beta_3 ROA_{i,t} + \beta_4 Turnover_{i,t} + \varepsilon_{i,t} \quad (2)$$

Among them, is a constant, SA is financing constraint, DIFI is digital financial index, is a random interference term, and the rest are control variables.

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**Table 2.** Hausman test

| | RE | FE |
|---|---|---|
| DIFI | -23.492 | 0 |
| | (-0.35) | (0.00) |
| COV | 12.647 | -0.029*** |
| | -0.35 | (-6.53) |
| USAGE | 6.935 | -0.036*** |
| | -0.35 | (-6.28) |
| DIGL | 3.798 | -0.045*** |
| | -0.35 | (-8.69) |
| _cons | -3.248*** | -3.251*** |
| | -591.36 | -545.84 |
| N | 24531 | 24531 |
| Hausman_Test | 0.0229 | |

## 5. Empirical Analysis of Digital Finance Relieving Financing Constraints for Small and Micro Enterprises

### 5.1. Descriptive Statistical Analysis

This article conducts data analysis on relevant variables, and the specific descriptive statistics are shown in Table 3.

**Table 3.** Descriptive Statistics

| Variable | Sample | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| SA | 24,532 | -3.517 | 0.268 | -4.823 | 0.373 |
| DIFI | 24,532 | 2.398 | 0.688 | 0.162 | 3.611 |
| COV | 24,532 | 2.425 | 0.723 | 0.0911 | 3.928 |
| USAGE | 24,532 | 2.309 | 0.673 | 0.322 | 3.543 |
| DIGL | 24,532 | 2.473 | 0.750 | 0.269 | 4.544 |
| TURN | 24,532 | 10.500 | 5.379 | 0.545 | 12.938 |
| ROA | 24,532 | 0.075 | 0.232 | 0.009 | 0.122 |
| WC | 24,532 | 0.124 | 0.733 | 0.000 | 0.920 |

According to Table 3, the maximum value of SA index is 0.373 and the minimum value is -4.823, indicating that there are significant differences in financing constraints among small and medium-sized enterprises. From the average value of -3.517, it can be seen that more than half of the financing constraint intensity of small and medium-sized enterprises is lower than the average financing constraint intensity. The minimum value of DIFI is 0.162 and the maximum value is 3.611, with a significant difference, indicating that there is an imbalance in the development of digital inclusive finance in China. The problem of uneven development in different regions can also be seen from the three indicators of coverage breadth, usage depth, and digitalization level. The average net profit margin of total assets is 0.075, indicating that the overall profitability of small and medium-sized enterprises is not ideal, making it difficult to support their loan repayment. Overall analysis shows that due to weak profitability, small and medium-sized enterprises may face more severe financing constraints.

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## 5.2. Correlation Analysis

To avoid the difficulty of empirical testing due to weak or excessive correlation between variables, this article conducted correlation testing on the main related variables before the basic regression, and the results are shown in Table 4.

**Table 4.** Correlation Test

| | SA | DIFI | COV | USAGE | DIGL | TURN | ROA | WC |
|---|---|---|---|---|---|---|---|---|
| SA | 1 | | | | | | | |
| DIFI | -0.274*** | 1 | | | | | | |
| COV | -0.263*** | 0.981*** | 1 | | | | | |
| USAGE | -0.261*** | 0.956*** | 0.892*** | 1 | | | | |
| DIGL | -0.275*** | 0.933*** | 0.871*** | 0.897*** | 1 | | | |
| TURN | -0.014** | 0.024*** | 0.024*** | 0.021*** | 0.024*** | 1 | | |
| ROA | 0.00900 | -0.034*** | -0.031*** | -0.035*** | -0.036*** | 0.00700 | 1 | |
| WC | 0.00100 | -0.020*** | -0.019*** | -0.022*** | -0.017*** | 0 | 0.355*** | 1 |

Note: * * *, * *, * * respectively indicate significant at the 1%, 5%, and 10% levels.

According to the correlation test results of various variables (see Table 4), the correlation coefficient between financing constraints of small and medium-sized enterprises (SA) and digital inclusive finance (DIFI) is -0.274, which is significant at the 1% level. Therefore, it can be preliminarily judged that the development of digital inclusive finance has a negative alleviating effect on financing constraints of small and medium-sized enterprises.

## 5.3. Benchmark Regression Analysis

**Table 5.** Benchmark Regression Analysis

| | (1) | (2) |
|---|---|---|
| | FE | System GMM |
| SA | | -0.155 |
| | | (-1.4320) |
| DIFI | -0.6800*** | -0.2230*** |
| | (-3.3120) | (-0.5330) |
| COV | 1.1298** | 2.7272** |
| | (0.3112) | (0.0072) |
| USAGE | 6.0988** | 4.8000** |
| | (0.3099) | (0.0055) |
| DIGL | 3.3396** | -0.0553** |
| | (0.3083) | (0.5081) |
| TURN | -0.0020*** | -0.0300*** |
| | (-2.7794) | (-0.0192) |
| ROA | -0.0002** | -0.0102* |
| | (0.2940) | (0.0050) |
| WC | 0.0002** | 0.0312** |
| | (1.4067) | (0.2065) |
| _cons | -3.2488*** | -3.1445*** |
| | (-5.902) | (-4.020) |
| AR(1) | | 0.0000 |
| AR(2) | | 0.6775 |
| Individual fixation | Fixed | - |
| Fixed time | Fixed | Fixed |
| N | 24490 | 24490 |
| adj. R2 | 0.667 | |

Note: * * *, * *, * * respectively indicate significant at the 1%, 5%, and 10% levels.

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According to the data in the first column of Table 5.3, the fixed effects model reveals a value of 0.6800 for the DIFI parameter, which is considered significant with a probability greater than 99%. This undoubtedly confirms the positive role of digital finance in alleviating financing constraints for small and medium-sized enterprises. The second column is the estimation analysis of the GMM (Global Maximum Likelihood) model, which shows that the estimated DIFI parameter is 0.2230, which is also recognized as significant at the 99% level. By comparing various control variables, we can find that the return on assets of a company significantly leads to a negative financing constraint effect. As the return on assets directly reflects a company's profitability, strong profitability can alleviate external financing pressure and further alleviate financing constraints. In addition, the working capital ratio reflects the vitality and efficiency of a company's operations, and the higher the ratio, the stronger its operational strength, thus reducing financing risks and difficulties. In summary, the setting of these control variables is closely related to the reality of enterprise development, ensuring the accuracy of indicators.

## 5.4. Panel Fixed Effects Model Estimation

**Table 6.** Main dimensions of the role of digital inclusive finance

| Variable | (1) | (2) | (3) |
|---|---|---|---|
| cov | -0.276*** | | |
| | (0.0431) | | |
| usage | | -0.441*** | |
| | | (0.0338) | |
| digl | | | -0.262*** |
| | | | (0.0307) |
| _cons | -2.0277** | -2.6160*** | -2.7732** |
| | (0.2200) | (0.0145) | (0.0520) |
| Individual fixation | Fixed | Fixed | Fixed |
| Fixed time | Fixed | Fixed | Fixed |
| R2 | 0.6445 | 0.7235 | 0.6890 |
| Observations | 17,827 | 17,827 | 17,827 |

Table 6 further characterizes the impact of the breadth, depth of use, and degree of digitization of digital inclusive finance on the financing constraints of enterprises on the New Third Board. Columns (1) - (3) are the estimated results of the panel fixed effects model. Column (1) shows that the coefficient of coverage breadth (COV) is -0.276, which is significant at the 1% level. Column (2) shows that the coefficient for using depth is -0.441, which is significantly negative at the 1% level. Column (3) shows that the coefficient of degree of digitization (DIG) is -0.262, which is significantly negative at the 1% level. Research has shown that the breadth, depth, and degree of digitization of digital inclusive finance can effectively reduce the difficulty of financing for small and medium-sized enterprises, with coverage breadth being the most significant, followed by depth of use and degree of digitization. Therefore, small and medium-sized enterprises should attach great importance to and practice multiple dimensions of digital inclusive finance, including coverage breadth, depth of use, and degree of digitization, especially from the perspective of coverage breadth. For example, in terms of expanding its coverage, enterprises can improve employees' awareness and mastery of digital technology by combining the Internet, cloud computing platform, big data and other means; In addition, utilizing digital advantages to integrate user information and provide convenient services is also beneficial for promoting economic development.

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### 5.5. Robustness Testing

This article conducts the following robustness tests: (1) Changing the measurement indicators of the dependent variable. Referring to the cash cash flow sensitivity model proposed by Almeida et al. (2004) to measure financing constraints, the dependent variable is changed to changes in cash holdings. At this point, the calculation method for the dependent variable is: change in cash holdings=net increase in cash and cash equivalents held by the enterprise/total assets at the beginning of the period. (2) Add control variables. Add the asset liability ratio representing financial leverage as a control variable. The regression results indicate that whether replacing the dependent variable or adding control variables, the core explanatory variable DIFI (Digital Inclusive Finance) passed the significance test, so the research conclusion of this article is relatively robust.

**Table 7.** Robustness Test

| Variable | (1) | (2) |
|---|---|---|
| difi | -0.014** | -0.0438** |
| | (0.008) | (0.0217) |
| cov | -0.146** | -0.0345* |
| | (0.2405) | (0.0036) |
| usage | -0.185* | -0.0880* |
| | (0.0687) | (0.0197) |
| digl | -0.168* | -0.1084** |
| | (0.9905) | (0.0207) |
| _cons | -2.0327** | -2.0572** |
| | (1.1530) | (1.0355) |
| Individual fixation | Fixed | Fixed |
| Fixed time | Fixed | Fixed |
| R2 | 0.7343 | 0.6652 |
| Observations | 17,827 | 17,827 |

## 6. Conclusion and Policy Recommendations

### 6.1. Research Conclusion

This article verifies the alleviating effect of digital inclusive finance on financing constraints of small and medium-sized enterprises from the perspective of policy effects, and further expands the mechanism path of digital inclusive finance alleviating financing constraints of small and medium-sized enterprises by incorporating the moderating effect testing program of Wen Zhonglin et al. into the double difference model. This study indicates that:

Firstly, the development of digital inclusive finance has a significant alleviating effect on the financing constraints of small and medium-sized enterprises, especially under the policy impact of the Development Plan issued by the State Council in December 2015. The mitigating effect is significantly stronger after the policy impact than before, but it is affected by strong financial supervision, and the mitigating effect is somewhat unstable. Secondly, compared to traditional inclusive finance, digital inclusive finance has a more significant effect on alleviating financing constraints for small and medium-sized enterprises, mainly achieved through the coverage, depth of use, and degree of digitization of digital finance. Compared to traditional inclusive finance, digital inclusive finance has advantages such as low cost, fast speed, and wide coverage, making it more advantageous in alleviating financing constraints for small and medium-sized enterprises.

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## 6.2. Policy Recommendations

### 6.2.1. Strengthen Investment in Digital "New Infrastructure" and Improve the Stable Foundation of Digital Finance Development

Big data, cloud computing, AI, blockchain and other digital infrastructure are the basis for the vigorous development of digital finance. Thanks to the rapid rise of mobile Internet technology, mobile payment, Internet insurance and other financial services have become reality and full of vitality; Similarly, with the rapid progress in the fields of big data and cloud computing, digital credit reporting has become a new way of credit reporting, effectively assisting financial systems in solving information asymmetry problems and enhancing the diversity of financial services. Therefore, it is vital to actively promote the "new infrastructure" planning in 5G, AI, big data center, industrial Internet and other fields, which will boost the healthy and sustainable development of digital finance. To this end, first of all, SMEs should be motivated to actively seek cloud platform services, information development and industrial Internet support. This is a key measure to improve the informatization level of digital finance demand side, which can not only create conditions for SMEs to more easily accept digital financial services, but also help digital financial institutions to more accurately access digital information of enterprises; Secondly, at the policy level, it is necessary to grasp the direction of "new infrastructure" and implement various strategies, especially tilting towards remote areas, in order to promote the digital transformation process of financial institutions and enterprises and help improve the digital financial ecosystem.

### 6.2.2. Promote the Deep Integration of Digital and Finance, and Improve the Digital Financial Ecosystem

The deep integration of digital and finance helps to achieve inclusive financial services, allowing "underdeveloped area enterprises", "non-state-owned enterprises", and "small enterprises" that find it difficult to obtain funds to enjoy financial resources and optimize resource allocation. It will undoubtedly promote the further integration and development of the digital finance industry. The specific implementation plan includes: traditional financial institutions should accelerate the pace of digital transformation, tap into existing advantages, and explore digital businesses with unlimited potential such as online banking and intelligent services. On this basis, we will moderately guide financial institutions and fintech companies to collaborate and innovate, forming a virtuous cycle of mutual learning and borrowing. At the same time, enterprises should also change their mindset, try to accept emerging financing methods such as digital finance, reduce excessive reliance on traditional financing channels and internal financing, and achieve diversification of financing channels through multiple channels.

### 6.2.3. Effectively Prevent Digital Financial Risks and Maintain Stable Development of Digital Finance

While diversifying digital financial products, there are also many hidden risks: for example, in the process of mining information, small and medium-sized enterprises engage in fraudulent behavior by forging transaction information, logistics information, etc., making it difficult to distinguish the authenticity of information; Furthermore, digital financial products such as P2P are rapidly entering traditional financial markets, and due to regulatory oversight not keeping up with the pace of industry development, there is a risk of regulatory loopholes and derivative risks. In order to effectively avoid such risks, we need to: firstly, strengthen information review to ensure the authenticity and credibility of information; The second is to optimize regulatory strategies and adapt to the development and changes of the digital finance industry. Therefore, while encouraging the development of digital finance, it is more important to prevent the occurrence of digital financial risks in order to maintain the long-term stable development of digital finance. This puts higher demands on digital financial institutions and regulatory systems to adapt to the rapid development of digital finance. On the one hand, digital financial

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enterprises can exert market information supervision power by opening "reporting" channels, and should also timely review the shortcomings of existing information channels to improve the information collection system; On the other hand, regulatory authorities should not only dynamically adjust the existing regulatory system with the development of digital finance, but also prevent potential financial risks through on-site research, technological supervision, and other means. It is more important to clarify the current development of digital gold.

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