

Does Digital Finance Fuel Corporate Financialization? Evidence from China's Real Sector and Its Implications for Sustainable Development

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ABSTRACT This study investigates whether digital finance promotes corporate financialization in China's real sector and examines its implications for sustainable development. Using data from Chinese A-share listed non-financial companies from 2011 to 2023, a two-way fixed-effects model is constructed to evaluate the influence of digital finance on financial asset investment by real-sector enterprises. Digital finance is measured using the Peking University Digital Inclusive Finance Index, while corporate financialization is measured by the proportion of financial assets to total assets. The results show that digital finance significantly increases financial asset allocation by real enterprises and accelerates over-financialization. This effect is more pronounced among non-technology-intensive firms, enterprises led by chief executive officers without financial backgrounds, and firms in non-high-pollution industries. Mechanism analysis indicates that digital finance promotes financial investment by alleviating financing constraints and reducing financial leverage, thereby creating additional space for financial asset allocation. Further analysis shows that such financial investment weakens core business performance. The findings provide empirical evidence for guiding digital finance toward real-economy development and sustainable capital allocation.

INDEX TERMS digital finance, corporate financialization, financial assets, financing constraints, sustainable development

I. INTRODUCTION

THE swift advancement of digital finance has significantly reconfigured the financial scenery both in China and across the globe, fundamentally reshaping the capital allocation and investment behaviors of manufacturing enterprises. As an outcome of the in-depth combination of digital technology and conventional finance, digital finance offers notable benefits, including reducing service entry barriers, expanding financing avenues, and boosting information effectiveness [1,2]. This injects fresh impetus into the growth of the real economy. Prevailing research commonly concurs that digital finance can efficiently ease corporate financing restrictions [3], heighten technological innovation efficiency[4], diminish debt default risks [5], and optimize the efficiency of resource allocation[6]. Collectively, these positive impacts improve the investment and financing conditions for real-world enterprises, offering strong financial backing for their sound development. Nonetheless, although digital finance offers numerous conveniences, it can also give rise to adverse effects that should not be dismissed. The available scholarly works suggest that the

advancement of digital finance has, in reality, increased the income gap between urban and rural regions, heightened the probability of households facing debt difficulties[7], and might even result in inefficient corporate investment [8]. On the corporate front, digital finance can also bring about non-negligible negative consequences. Based on the financial development theory, financial progress, which encompasses digital finance, has the potential to stimulate economic growth. Nevertheless, excessive expansion of the financial sector may displace the real economy. In the current complex economic environment characterized by insufficient domestic demand and declining returns on investment, real enterprises already face pressure on core business profitability, making them prone to arbitrage motives of pursuing short-term excess returns through financial investment [9]. The rise of digital finance precisely provides great convenience for translating such motives into actual actions. By lowering entry barriers and transaction costs for financial investment while offering diversified investment channels, digital finance services empower a wide range of businesses, particularly those of small and medium scale, to

allocate financial assets more conveniently [10]. Although academic debate persists regarding the connection between digital finance and financial investment in real enterprises, some scholars argue that digital finance has the potential to restrain the inclination of businesses to “decouple from the real economy” [11]. Nonetheless, several other research endeavors have determined that digital finance may instead exacerbate the financialization of enterprises [12,13]. Unfortunately, only a few studies have deeply examined and revealed this negative effect of digital finance potentially inducing real enterprises to increase financial asset investment. There remains a lack of systematic exploration regarding its underlying mechanisms, heterogeneous manifestations, and consequent economic outcomes, particularly the potential erosion of core business performance.

As one of the world’s most dynamic digital financial markets, China is undergoing a structural transition characterized by over-financialization—the reallocation of capital from the real sector to financial assets. This provides a valuable quasi-natural experiment to examine how digital finance influences the investment behavior of real enterprises. Consequently, this paper centers on the central problem of digital finance’s stimulative impact on real enterprises’ financial investments and the associated economic outcomes. Utilizing data from non-financial publicly traded firms in China’s A-share market covering the period from 2011 to 2023, it undertakes a systematic empirical study by employing a two-way fixed effects model as well as a mediation effect model. The first point is that we gauge financial investment by calculating the proportion of financial assets relative to the overall assets. Meanwhile, digital finance is evaluated via the Peking University Digital Inclusive Finance Index. In contrast to prior research, our model integrates a series of control variables. These variables comprehensively mirror both macro and micro factors that exert influence, thereby boosting the reliability of our research results. We discover that digital finance significantly stimulates financial asset investment in real economy enterprises, intensifying their tendency toward over-financialization (i.e., economic decoupling from the real sector). Following the execution of fourteen tests for robustness, the research findings remain valid. These tests encompass various methods. First, an instrumental variable two-stage least squares approach was employed, using a Bartik-style instrument constructed from initial city-level digital finance levels and national growth rates. Second, the Oster test was conducted. In addition, there were modifications to the measurement methods. The digital finance measures were replaced, specifically by substituting city-level indices with provincial ones. The financial asset measures were adjusted as well. Several model-related and control-variable adjustments were made. A Tobit model was utilized. Time trends were controlled for, and two-way fixed effects of province-year and industry-year were taken into account. The samples from municipalities directly under the central government were excluded. The sample period

was adjusted to span from 2013 to 2023, and a subsample from 2011 to 2017 was used for regression. Regarding the standard errors, different clustering methods were applied. The standard errors were clustered at the industry level, at the city level, and a dual-dimensional clustering by city and industry was also employed. Secondly, we explore the causal pathways through which digital finance influences real enterprises’ financial investments. Results indicate that digital finance alleviates financing constraints and reduces financial leverage, thereby creating conditions and space for real enterprises to engage in financial investments. This indicates that while alleviating financing constraints, digital finance may also indirectly provide enterprises with disposable capital for financial investment. Thirdly, conducting heterogeneity analysis across three firm characteristics—state-owned status, CEO financial background, and high-pollution industry affiliation—reveals that digital finance strengthens the tendency toward financial investment, particularly in non-technology-intensive firms, enterprises led by CEOs without financial backgrounds, and high-pollution industries. Non-state-owned enterprises, lacking long-term investment opportunities, are more inclined to channel funds into financial sectors. Enterprises led by CEOs without financial backgrounds previously faced higher barriers to financial market participation; digital finance lowers these barriers, thereby producing a larger marginal effect on financial investment in such firms. Non-heavy-polluting enterprises, facing less stringent environmental regulations and lower urgency for transformation, tend to channel surplus funds into financial markets to pursue short-term returns rather than invest in green technology R&D—which involves long cycles and slow returns—after digital finance expands their financing channels. Finally, this research explores the economic ramifications of the influence of digital finance on the financial investments of businesses, our analysis focused on its effects on future core business performance. Findings reveal that by driving financial investments, digital finance ultimately imposes a substantial adverse effect on the future performance of the core business. This finding confirms that corporate financial investments are driven more by arbitrage motives than precautionary savings motives. In other words, while digital finance facilitates corporate financial investments, it ultimately erodes the foundation of real economic development. This study not only theoretically clarifies the unique pathways and logic through which digital finance promotes financial investments in real enterprises but also provides crucial empirical evidence and policy recommendations for guiding digital finance “from virtual to real” and precisely serving the high-quality development of the real economy.

The main marginal contributions of this research paper are manifested in the following areas: Firstly, given the current absence of a unified view in the academic community on how digital finance impacts the financial investments of real enterprises, this study develops two-way fixed-effects models and mediation effect models. These models serve to

verify the favorable impact of digital finance on the financial investments made by real-world enterprises. Moreover, the study uncovers the mediating roles of financing constraints and financial leverage, thus augmenting the related research in the areas of digital finance and real enterprise investment behavior. Secondly, in the heterogeneity analysis, apart from investigating the technological intensity of enterprises and the financial background of CEOs, this paper specifically takes into account whether an enterprise belongs to a heavily polluting industry. Among non-highly polluting enterprises, the stimulating impact of digital finance on the financial investments of real-economy companies is more pronounced. This indicates that environmental regulations have, to a certain extent, exerted a “reverse pressure” effect, curbing financial arbitrage activities by heavily polluting enterprises and compelling them to allocate more resources toward green transformation. This finding not only aligns with the current policy emphasis on green and sustainable development but also offers crucial policy insights for regulators on leveraging the synergistic effects of environmental regulations and digital finance policies. This approach can drive heavily polluting enterprises to shift from speculative to real economic activities, ultimately achieving green, high-quality development. Third, this paper deeply explores the economic consequences of real enterprises’ financial investment behavior changes on their core business performance, providing a basis for regulatory authorities to prevent risks of excessive corporate financialization. Fourth, the research conclusions of this paper offer important evaluation viewpoints for governments and enterprises in formulating investment strategies and regulatory policies in the digital finance era. These viewpoints assist in steering digital finance towards better serving the sustainable development of the real economy, specifically promoting the high-quality ‘virtual-to-real’ transition within manufacturing enterprises through optimized capital allocation.

II. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

The extant body of literature on “elements affecting corporate financial investment decisions” can be categorized into two broad levels: the macro-economic landscape and firms at the micro-level. On the macro scale, alterations in monetary policy, the unpredictability of economic policies, and the extent of financial market evolution significantly influence firms’ investment portfolio selections [14,15]. For example, expansionary monetary policies lower financing costs, potentially incentivizing firms to engage in financial investments for arbitrage motives; conversely, contractionary policies constrain liquidity, reinforcing firms’ precautionary savings motives. On the micro-scale, elements like the extent of a company’s financing limitations, the profitability of its main business operations, corporate governance frameworks, and managerial traits all have significant impacts on corporate financial investment choices [16]. The precautionary savings motive within liquidity management

theory posits that firms accumulate financial assets to hedge against future cash flow shortages, ensuring operational stability during economic downturns [17]. Conversely, the arbitrage motive suggests that when returns on real investments decline, companies give precedence to distributing resources towards financial assets in order to get short-term earnings. Additionally, agency theory indicates that when management compensation is tightly linked to short-term corporate performance, executives may favor investing in high-yield, short-cycle financial assets to meet performance targets—even if it means sacrificing the creation of long-term worth [18]. These theoretical perspectives collectively reveal the complexity of corporate financialization and provide a foundational analytical framework for examining how exogenous shocks, such as digital finance, reshape corporate investment behavior.

Digital finance, as an innovative fusion of information technology and financial services, influences corporate financial investment decisions through multiple channels, with alleviating financing constraints being one of the key pathways. In traditional credit markets, financing limitations generally arise from information disparity and elevated transaction expenses. For a long time, these issues have been impeding enterprises from obtaining external funds. Digital finance makes use of technologies like large-scale data analytics, blockchain, and mobile devices. It improves the precision of credit evaluations, cuts down on operating costs, and broadens the scope of financial service provision. As a result, it effectively alleviates these obstacles. Specifically, digital finance broadens enterprises’ financing channels, enabling them to access capital more efficiently through novel methods like online lending, crowdfunding, and digital payment systems [19]. This enhanced financing accessibility reduces reliance on costly internal funds and traditional bank loans, thereby alleviating liquidity pressures. According to resource allocation theory, when financing constraints ease, firms gain greater flexibility in asset allocation [20]. The alleviation of financing constraints through digital finance reduces the cost of external capital for firms. However, a lower cost of capital does not automatically dictate the direction of investment. Firms face a choice: allocate the newly accessible funds to expand core operations, or channel them into financial assets. This choice is governed by the relative returns on real versus financial investment. When returns on core operations are high, firms have a strong incentive to reinvest in productive capacity. When returns on core operations are low or declining, the opportunity cost of diverting funds to financial assets falls, and firms are more likely to pursue financial arbitrage. In this scenario, the precautionary saving motive weakens—firms no longer need to hold financial assets as a liquidity buffer—but the arbitrage motive strengthens by more, as cheaper external capital lowers the cost of pursuing yield spreads. The net effect is an increase in financial asset holdings. During the sample period from 2011 to 2023, the average return on operating assets of Chinese industrial firms declined

steadily. The operating profit margin of manufacturing firms above designated size fell from its peak in 2021 to 4.63% in 2024, while the 10-year treasury yield fell to a record low of 1.55%, reflecting a persistent ‘asset shortage’ in the real sector. Under these conditions, cheaper external financing does not stimulate productive investment because the marginal return on expanding core operations is insufficient to justify the capital outlay. Instead, firms use the low-cost capital provided by digital finance to invest in financial assets that offer higher yields relative to their risk profile. This is the arbitrage channel: digital finance lowers the hurdle rate for financial investment more than it stimulates real investment, leading to a net reallocation of capital toward financial assets.

Additionally, digital finance can also promote corporate financial investment by reducing financial leverage. Financial leverage reflects a firm’s dependence on external borrowing and the corresponding default risk. Leveraging its efficiency-enhancing and risk-mitigating characteristics, digital finance can directly influence corporate leverage levels. For instance, digital platforms have promoted the growth of direct financing avenues like equity crowdfunding and peer-to-peer lending, helping to dilute firms’ reliance on debt financing and optimize their capital structures[21]. Moreover, digital financial services increase the transparency of information, enabling firms to access customized financial services aligned with their risk profiles. This curbs excessive borrowing and reduces leverage ratios. From the vantage point of a trade-off theory, companies weigh the advantages of the tax shield associated with debt against the expenses related to financial distress; digital finance reduces information asymmetry and monitoring costs, prompting firms to shift toward more efficient, lower-leverage capital structures. As debt burdens ease, firms face reduced financial distress risks and improved cash flow conditions. This, in turn, makes resources available for self-directed investment. According to the surplus cash-flow theory, when managers possess surplus cash flows—particularly amid uncertain core business prospects or declining profit margins—they may favor investing in financial assets for quick returns [22], aligning with arbitrage motives. Thus, digital finance reduces financial leverage, freeing up corporate capital and creating conditions for financial investments. Driven by arbitrage motives, this intensifies the financialization of real enterprises. Based on the analysis presented above, we put forward the following supposition:

H1: Digital finance promotes the financial investment of real enterprises.

III. MODELLING AND VARIABLE DESCRIPTION

A. SOURCES OF SAMPLE DATA

As the research sample, we employed data from Chinese A-share listed firms in the Shanghai and Shenzhen stock markets spanning the period from 2011 to 2023. To ensure the reliability of the empirical results, the data are screened as follows: we excluded special enterprise samples marked

with ST and *ST. This study conducts research on the real economy, and Huang defined the broad real economy as industries other than finance and real estate[23]. This study excludes the samples of enterprises in the financial industry and the real estate industry; we also excluded the samples with data anomalies and part of the missing data. Finally, this paper obtains 32,718 observations. The digital financial data refers to the ‘Peking University Index of Digital Financial Inclusion’. This index is put together by the Research Center for Digital Finance at Peking University ; the microenterprise data is from the China Stock Market & Accounting Research Database (CSMAR). To address potential bias from outliers, the continuous variables underwent winsorization at the first and ninety-ninth percentiles.

B. DESCRIPTION OF VARIABLES

1) Independent Variable

The measurement of digital finance (DIF) is carried out by dividing the city-level digital inclusive finance index by 100. Its rationale is that the numerical range of the DIF index is much larger than that of the explanatory variables, which may lead to overdependence of the model, affecting the results of the measurement. Scaling it ensures that the numerical ranges of all the variables are relatively uniform and avoids the above situation.

2) Implicit Variable

In this research, the variable for financial assets allocation(Fin) is represented by the proportion of financial assets to total assets. In prior research, there is variation in how financial assets are defined. Du et al. [24] and Peng et al.[25] classify trading financial assets, derivative financial assets, loans and advances, available-for-sale financial assets, held-to-maturity investments, and investment property as financial assets—a measurement approach widely accepted in the literature. However, given the relatively small scale of shadow banking in China, following Feng et al. [26], we exclude ‘loans and advances’ from financial assets. Moreover, for most non-financial real-sector firms, loans and advances are not standard investment instruments; they typically represent intra-group financing or trade-related activities. Therefore, when constructing the core explanatory variable, we exclude loans and advances. The calculation formula is presented below:

$$Fin = \frac{TS + FD + AS + FA + HMI + NAIP}{TA} \quad (1)$$

In the model, TS refers to trading securities, FD refers to financial derivative, AS refers to available for sale, FA refers to financial assets, HMI refers to held to maturity investments, NAIP refers to net amount of investment property and TA refers to total assets.

3) Intermediary Variables

For the subsequent reasons, we utilize the absolute value of the SA index as a stand-in for financing constraints when

dealing with financing constraints (SA): the construction of the SA index requires only two easily accessible and objective indicators—firm age and firm size—which helps avoid endogeneity issues and facilitates large-scale cross-sample studies. A lower SA value (that is, a greater absolute value) suggests more acute financing limitations. The SA index is computed in the following manner:

$$SA_{i,t} = -0.737 \times Size_{i,t} + 0.043 \times Size_{i,t}^2 - 0.040 \times Age_{i,t} \quad (2)$$

where Size represents firm size and Age represents firm age.

Financial leverage, represented by the variable Lev1, is measured as the proportion of long-term debt to shareholders' equity. This ratio serves as a surrogate variable for gauging financial leverage. In essence, a greater value of this ratio indicates a higher degree of financial leverage within the enterprise.

4) Control Variables

This research chooses the subsequent eleven control variables from both micro and macro perspectives, taking into account the financial setup of businesses and the macroeconomic context in which they function. At the micro-business level, the variables are the debt-to-asset proportion (Lev), company scale (Size), equity centralization (Share), enterprise growth potential (Growth), asset return rate (ROA), CEO dual role (CD), and the percentage of independent directors (IndeRatio). At the macro level, the variables are the economic advancement level (PGDP), industrial structure degree (Second), financial development stage (Loan), and internet diffusion rate (Internet). Detailed definitions and measurement methods of all variables are provided in Appendix A.

C. MODEL CONSTRUCTION

This study constructs the following fixed effects model to test the impact of digital finance on financial investment in real firms:

$$Fin_{i,t} = \alpha_0 + \alpha_1 DIF_{c,t} + \alpha_2 Controls_{i,t} + Firm_i + Year_t + \varepsilon_{i,t} \quad (3)$$

In addition, to explore the testing mechanism of digital finance on financial investment in real enterprises, this study draws on Jiang [27] to construct the following mediation effect model: in the first step, we test model (3); in the second step, we use model (4) to test the mediation effect, with the explanatory variable being the mediator variable (med) and test the existence of the mediation effect through the above path.

$$med_{i,t} = \beta_0 + \beta_1 DIF_{c,t} + \beta_2 Controls_{i,t} + Firm_i + Year_t + \varepsilon_{i,t} \quad (4)$$

The standard errors for the above model employ robust standard errors to address heteroskedasticity; $Fin_{i,t}$ denotes financial asset allocation; $DIF_{c,t}$ denotes the level of digital finance; $med_{i,t}$ denotes the intermediary variables; $Control_{i,t}$ denotes the set of control variables; $\varepsilon_{i,t}$ is the random perturbation term; subscript i denotes the enterprise; subscript t denotes the year; $Year_t$ is the time fixed effect; $Firm_i$ is the individual fixed effect. In model (3), if α_1 is significantly positive, it means that digital finance can increase the financial assets of enterprises, i.e., digital finance promotes the financial investment of real enterprises; in model (4), if β_1 is significant, it means that the intermediary variables can effectively affect the explanatory variables, i.e., the selected mechanism variables hold.

IV. ANALYSIS OF EMPIRICAL RESULTS

A. DESCRIPTIVE TEST

Table 1 presents the descriptive analysis of relevant variables. It can be observed that for the financial asset allocation of real-sector enterprises, the highest value is 0.646, the lowest value is 0, and the average value is 0.076. This implies that the financial asset allocation among enterprises is uneven, and there are substantial disparities in the intensity of financial investment across different enterprises. The descriptive statistics for digital finance show substantial variance across regions. The index ranges from 0.350 to 3.732, with a mean of 2.557 and a standard deviation of 0.819. This indicates substantial regional variation in digital finance development across China. Correspondingly, the influence of digital finance on the financial investment of real-sector enterprises will be affected by the digital finance development level of the region where the enterprise is located.

B. RETURN TO BASELINE

Table 2 showcases the outcomes of the benchmark regression. In Column (1) of Table 2, the findings of a univariate regression are reported. Here, the explanatory variable is digital finance (DIF), and financial asset allocation (Fin) serves as the explained variable. The coefficient of digital finance (DIF) is found to be 0.020, and it passes the significance test at the 1% level. This implies that digital finance enables real-world firms to augment their financial assets. In other words, digital finance makes a significant contribution to the financial investments of real firms. In Column (2), individual fixed effects and time fixed effects are incorporated into the model presented in Column (1). After this addition, the coefficient of digital finance (DIF) stands at 0.037, and it is significant at the 1% level. This further demonstrates that as the development level of digital finance rises, its contribution to the financial investments of real enterprises also increases. Column (3) includes control variables in the regression analysis carried out in Column (2). The coefficient of digital finance (DIF) is 0.050, which passes the significance test at the 1% level. This shows that even after comprehensively taking into account the

TABLE 1. Descriptive statistics

Stats	Max	Min	Mean	P50	SD	N
Fin	0.646	0.000	0.076	0.034	0.106	32718
DIF	3.732	0.350	2.557	2.795	0.819	32718
Lev	0.950	0.028	0.408	0.398	0.206	32718
Size	27.460	19.290	22.170	21.970	1.285	32718
Share	76.530	7.240	33.570	31.110	14.820	32718
Growth	4.519	-0.671	0.143	0.091	0.390	32718
ROA	0.256	-0.592	0.046	0.049	0.075	32718
Dual	1.000	0.000	0.307	0.000	0.461	32718
IndeRatio	0.600	0.300	0.378	0.364	0.054	32718
PGDP	13.230	9.523	11.860	11.930	0.761	32718
Second	0.689	0.149	0.389	0.399	0.114	32718
Loan	4.487	0.385	1.809	1.931	0.689	32718
Internet	0.783	0.000	0.343	0.354	0.135	32718

business operations of enterprises and adding the two-way fixed effects of individual and time, the regression result indicating that digital finance significantly promotes the financial investments of brick

and-mortar enterprises remain valid. This validates Hypothesis 1, which posits that digital finance has a positive influence on the financial investment behavior of real enterprises.

C. ROBUSTNESS CHECK

The benchmark regression results suggest that digital finance promotes financial investment in real firms. However, given that the regression results may be biased due to possible endogeneity and heteroscedasticity among the variables, this part of the study conducts a robustness test for the benchmark regression results.

1) Endogeneity Test

Following the Bartik instrument approach [28,29], we construct an instrumental variable by interacting each city's initial digital finance level in 2011 with the national growth rate of digital finance in subsequent years. The initial level captures cross-city variation in digital finance development potential, while the national growth rate is exogenous to any individual city's economic conditions. This approach isolates variation in digital finance driven by common national trends rather than local economic shocks, satisfying the exclusion restriction. The validity of the instrument is assessed using standard diagnostic tests. The outcomes are presented in Panel A of Table 3. The selected instrumental variable passes the under-identification test and the weak identification test, confirming its validity. The two-stage least squares (2SLS) test results are shown in Panel A of Table 3. In the first stage, Column (1) indicates that the coefficient of the instrumental variable is 0.181, and it is significant at the 1% level. This suggests a robust association between the instrumental variable and the explanatory variable. Column (2) presents the results of the second-stage test, where the coefficient for Digital Finance (DIF) is 0.106 and significant at the 1% level, consistent with the benchmark regression results. The endogeneity test confirms that the conclusion that digital finance promotes

financial investment by real enterprises remains valid even after accounting for endogeneity factors.

This study employs the approach put forward by Oster [30] to investigate whether the impact of core explanatory variables on the dependent variable is due to omitted variables. The findings of the test are presented in Panel B of Table 3. For the actual impact of the central explanatory variable (DIF) to be diminished to nil, the required strength of omitted variable selection bias must reach 6.505 times that of the observed variable—a value significantly exceeding the $\delta > 1$ robustness criterion. The adjusted coefficient for DIF is 0.061, which falls within the confidence interval of the baseline estimate and remains significantly positive. Thus, the research conclusions demonstrate robust stability to potential omitted variable bias.

2) Alternative Measures of Variables

To address possible endogeneity problems stemming from measurement inaccuracies or sample selection prejudice related to city-level indices, this research substitutes the proxy variable for digital finance with a provincial-level digital finance index (referred to as DIF1). This provincial-level index is constructed in a similar manner to the city-level index. The regression outcomes, presented in Column (1) of Panel A in Table 4, remain in line with the baseline results. To ensure that our core findings are not driven by the narrow definition of financial assets that excludes loans and advances, we also employ the broader measurement framework as a robustness test. This approach, which retains loans and advances as a component of financial assets, captures a wider spectrum of corporate financial activities and serves as a useful benchmark for validating the sensitivity of our results to alternative asset classifications. The financial asset allocation (Fin1) is recalculated and integrated into the econometric model for testing. The regression results, shown in Column (2) of Panel A in Table 4, suggest that even after replacing the measure of the explanatory variable, the regression results still match the baseline regression.

3) Change Model Settings

To further validate the reliability of the benchmark regression outcomes, modifications were made to the model

TABLE 2. Benchmark regression results

	(1) Fin	(2) Fin	(3) Fin
DIF	0.020*** (30.52)	0.037*** (4.76)	0.050*** (5.78)
Lev			−0.032*** (−6.68)
Size			−0.007*** (−5.75)
Share			−0.000*** (−4.82)
Growth			−0.007*** (−6.30)
ROA			−0.027*** (−3.19)
Dual			−0.003* (−1.94)
IndeRatio			−0.013 (−1.16)
GDPPC			−0.007* (−1.96)
SecIndGDP			0.031** (2.22)
FinDev			0.000 (0.15)
IPR			−0.005 (−1.05)
_cons	0.024*** (14.23)	−0.019 (−0.94)	0.208*** (4.64)
Firm FE	No	Yes	Yes
Year FE	No	Yes	Yes
Adj.R ²	0.025	0.622	0.626
N	32718	32718	32718

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

TABLE 3. Endogenous testability

Panel A	(1) Fin	(2) Fin
Bartik_IV	0.181*** (0.00)	
DIF		0.106*** (0.02)
Controls	Yes	Yes
Adj.R ²		−0.072
N	32006	32006
Kleibergen-Paap rk LM statistic		1541.522 ***
Kleibergen-Paap rk Wald F statistic		3499.750

Panel B

Testing Methods	Criteria for Judgment	Calculation results	Passed inspection
(1)	$ \delta(\beta = 0, R_{\max} = 1.3R) > 1$	$\delta^* = 6.505 > 1$	Yes
(2)	[0.020, 0.050]	$\beta^* = 0.061$	Yes

specification. Specifically, four alternative approaches were employed: adopting a Tobit model to address the truncated nature of the dependent variable ; controlling for time trends to absorb smooth, unobservable temporal variations; To simultaneously control for province-specific characteristics that do not change over time and time trends that are consistent across provinces, thereby more accurately identifying the net effect of core explanatory variables on the dependent variable, province-year two-way fixed effects were controlled for in the model(3); To account for unobservable elements at the industry level that vary over time,

industry-year two-way fixed effects were controlled for. The empirical findings are shown in Table 4. Specifically, they are presented in Panel A, columns (3) and (4), as well as Panel B, columns (1) and (2). These analyses yield conclusions consistent with the baseline regression, indicating its robustness.

4) Adjust the Sample Range

Robustness tests were conducted by adjusting the sample scope, specifically: To mitigate possible estimation inaccuracies stemming from disparities in administrative rank, resource endowments, and policy environments between

centrally-administered municipalities and prefecture-level cities, enterprise samples located in municipalities directly under the central government were excluded from the regression analysis. Given that 2013 is widely regarded as the starting point for digital finance development, the sample period was set to 2013–2023 for regression analysis; and to avoid interference from major exogenous shocks after 2018—instances such as the trade friction between China and the United States, the global COVID-19 health crisis, and the conflict between Russia and Ukraine—a subsample from 2011–2017 was used for regression. The outcomes of the regression analysis are presented in columns (3) and (4) of Panel B in Table 4, as well as column (1) of Panel C in Table 4. These results align with those of the baseline regression.

5) Switch to Standard Error Clustering Method

This section employs a robust testing approach using clustered standard errors. First, to address the possible correlation in residuals that may stem from shared shocks or policy impacts within the same industry, the standard errors are grouped at the industry level. Second, to eliminate intra-group correlations stemming from shared economic conditions or local government actions within the same city, the standard errors are grouped at the city level. Finally, we employed a dual-dimensional clustering approach combining city and industry dimensions. This method allows residuals to exhibit correlations across both industry and city dimensions, maximizing correction for potential dual clustering structures that could affect statistical inference. The outcomes of the tests, which are shown in columns 3 to 5 of Panel B in Table 4, validate the reliability of our research conclusions.

D. HETEROGENEITY ANALYSIS

To investigate whether digital finance exhibits heterogeneous characteristics in financial investments for real enterprises, this section's heterogeneity analysis categorizes the sample based on ownership nature into "technology-intensive enterprises—non-technology-intensive enterprises," based on whether the CEO possesses a financial background into "CEOs with financial background—CEOs without financial background," and based on whether the enterprise belongs to a heavily polluting industry into "heavily polluting industries—non-heavily polluting industries." Group regression analyses were conducted for each category.

1) Heterogeneity Analysis of Technologically Intensive Enterprises

Technology-intensive and non-technology-intensive enterprises exhibit significant differences in resource allocation and risk preferences, which may lead to varying degrees of impact from digital finance on the financial investments of these two categories of enterprises. Table 5, Panel A showcases the outcomes of the group-specific regression.

In Column (1), the regression findings for the sample of technology-intensive enterprises are reported. Meanwhile, Column (2) presents the regression results related to the sample of non-technology-intensive enterprises. The outcomes of the subgroup regression suggest that digital finance has a notably distinct influence on financial investment, contingent upon whether a company is technology intensive. This may stem from the fact that technology-intensive enterprises allocate a higher proportion of resources to fixed assets such as R&D compared to non-technology-intensive enterprises. When facing financing constraints, they tend to channel funds obtained through digital finance more heavily into fixed assets to support innovation and long-term development. Conversely, non-technology-intensive enterprises, lacking long-term investment opportunities, are more likely to redirect digital finance funds towards financial assets to pursue short-term returns. Consequently, the promotional impact of digital finance on financial investment is more evident for non-technology-intensive enterprises. This is due to the fact that such enterprises lack the long-term, high-return investment opportunities found in R&D and innovation. The provision of additional financing channels and liquidity by digital finance has been shown to result in an increased propensity for short-term arbitrage motives, leading to the allocation of these funds into financial assets rather than into long-term physical investments with uncertain returns.

E. HETEROGENEITY ANALYSIS OF CEO FINANCIAL BACKGROUND

As corporate managers, CEO decisions often determine the direction of a firm and play an important role in asset allocation and financial investment decision making [31]. CEOs with financial backgrounds possess specialized expertise and established networks that enable them to identify and execute financial investments regardless of whether digital finance platforms are available. In contrast, CEOs without financial backgrounds previously faced higher barriers to entry in financial markets due to lack of specialized knowledge and limited access to information and investment channels. Digital finance, by reducing transaction costs, broadening investment channels, and providing user-friendly financial platforms, disproportionately lowers these barriers for non-financial-background CEOs. As a result, the marginal effect of digital finance on financial investment is larger in firms led by CEOs without financial backgrounds. The findings from the grouped regression are shown in Table 5, Panel B. The coefficient for digital finance is 0.096 ($p < 0.01$) for firms with non-financial-background CEOs, compared to 0.030 ($p < 0.01$) for firms with financial-background CEOs. This difference supports the interpretation that digital finance democratizes access to financial investment opportunities, producing a stronger effect among CEOs who previously faced higher participation costs.

TABLE 4. Robustness test

Panel A				
	(1) Fin	(2) Fin1	(3) Fin	(4) Fin
DIF		0.050*** (5.78)	0.039*** (6.21)	0.031*** (3.00)
DIF1	0.027*** (4.44)			
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Time Trend	No	No	No	Yes
Adj.R ²	0.625	0.626		0.655
N	32718	32718	32718	25872
Panel B				
	(1) Fin	(2) Fin	(3) Fin	(4) Fin
DIF	0.034*** (3.86)	0.026*** (4.47)	0.070*** (7.53)	0.039*** (3.61)
Controls	Yes	Yes	Yes	Yes
Firm FE	No	No	Yes	Yes
Year FE	No	No	Yes	Yes
Province×Year FE	Yes	No	No	No
Industry×Year FE	No	Yes	No	No
Adj.R ²	0.074	0.119	0.623	0.635
N	32718	32677	24973	29150
Panel C				
	(1) Fin	(2) Fin	(3) Fin	(4) Fin
DIF	0.026*** (2.38)	0.050*** (3.09)	0.050*** (2.71)	0.050*** (2.45)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Adj.R ²	0.792	0.626	0.626	0.626
N	12302	32718	32718	32718

F. HETEROGENEITY ANALYSIS OF WHETHER AN INDUSTRY BELONGS TO THE HEAVY POLLUTION SECTOR

The state imposes differing regulatory intensities on heavily polluting industries versus non-heavily polluting industries, which determines variations in the extent to which enterprises invest in financial assets driven by arbitrage motives. Table 5, Panel C showcases the outcomes of the panel regression. The first column reports the regression results for enterprises belonging to non-high-pollution industries, while the second column reports the results for enterprises in high-pollution industries. The panel regression findings indicate that the stimulating impact of digital finance on the financial investments of real enterprises is more evident for those enterprises operating in non-high-pollution industries. This may stem from the fact that heavily polluting enterprises face stricter environmental regulatory pressures, compelling them to allocate more resources toward environmental compliance and green transformation, thereby reducing their participation in financial investments. Conversely, non-heavily polluting enterprises operate under relatively looser environmental oversight and enjoy greater freedom in capital allocation. With digital finance expanding investment channels, these firms are more likely to channel surplus

funds into financial markets driven by arbitrage motives.

G. MECHANISM ANALYSIS

The objective of this segment of the research is to investigate the mechanism by which it exerts its influence. Digital finance can broaden the channels of financial investment, improve enterprises' investment and

financing, alleviate financing constraints, and reduce financial leverage. Based on this, this paper constructs 'digital finance → financing constraints → financial investment' and 'digital finance → financial leverage → financial investment'. These are two paths to analyse the mechanism, using SA, Lev1 as a proxy variable for the intermediary variable financing constraints, brought into models (3) and (4) for testing. The regression outcomes are presented in Table 6. In Column (1), the regression results for Model (4) are shown, where the explanatory variable is SA. The regression coefficient of the explanatory variable (DIF) stands at 0.016, and this coefficient is statistically significant at the 10% significance level. This significance implies that digital finance can effectively mitigate financing constraints. Moving on to Column (2), it showcases the regression results of Model (4) when the explanatory variable is Lev1. Here, the coefficient of DIF is -0.486 , and it is significant

TABLE 5. Heterogeneity test

Panel A		
	(1) Fin	(2) Fin
DIF	0.019* (1.73)	0.066*** (4.65)
_cons	0.204*** (3.43)	0.205*** (2.61)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adj.R ²	0.670	0.595
N	16287	16204
Panel B		
	(1) Fin	(2) Fin
DIF	0.096*** (5.58)	0.030*** (2.73)
_cons	0.073 (0.78)	0.295*** (5.19)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adj.R ²	0.656	0.640
N	9127	22753
Panel C		
	(1) Fin	(2) Fin
DIF	0.041*** (3.51)	0.030*** (2.21)
_cons	0.304*** (5.38)	−0.023 (−0.32)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adj.R ²	0.630	0.650
N	22771	9877

TABLE 6. Mechanism analysis

	(1) SA	(2) Lev1
DIF	0.016* (1.95)	−0.486** (−2.49)
_cons	−3.652*** (−75.23)	−0.174*** (−0.14)
Controls	Yes	Yes
Firm FE	Yes	Yes
Year FE	Yes	Yes
Adj.R ²	0.962	0.147
N	32718	32718

at the 5% level. This significance also suggests that digital finance is effective in alleviating financing constraints. Overall, financing constraints and financial leverage serve as intermediaries when digital finance promotes the financial investment of real enterprises. This finding validates the two pathways established in this research, that is, digital finance reduces the financial leverage of enterprises by effectively alleviating financing constraints and then promotes the financial investment of enterprises.

V. FURTHER ANALYSIS

Appropriate financial investment is conducive to reserve funds to face the higher financing constraints, that is, the enterprise makes preventive savings motivated by the investment in financial assets. However, some companies continue financial investments even after easing financing constraints, pursuing the attractive returns from financial assets—indicating speculative motives behind such investments. In order to investigate

the impact of digital finance on the future operational performance of enterprises subsequent to the facilitation of real enterprises' financial investments, this part assumes that there exists the path of 'digital finance-financial investment of enterprises-future business performance of enterprises', and constructs the following econometric model to verify whether this path is valid.

$$MP_{i,t+1} = \delta_0 + \delta_1 DIF_{c,t} + \delta_2 Control_{i,t} + Firm_i + Year_t + \varepsilon_{i,t} \quad (5)$$

$$MP_{i,t+1} = \theta_0 + \theta_1 DIF_{c,t} + \theta_2 Fin_{i,t} + \theta_3 Control_{i,t} + Firm_i + Year_t + \varepsilon_{i,t} \quad (6)$$

TABLE 7. Further analysis

	(1) P_MP	(2) Fin	(3) P_MP
DIF	−0.039*** (−3.46)	0.050*** (5.78)	−0.037** (−3.23)
Fin			−0.047*** (−5.21)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Adj.R ²	0.373	0.626	0.374
N	25872	32718	25872

Where MP is a proxy variable for the firm's main business performance. This main business performance is affected by the relevant decisions made in the preceding period; regression analysis is conducted using the firm's main business performance in the next period (P_MP). Referring to Du et al. (2017), the main business performance is calculated using the subsequent formula:

$$MP = \frac{OP - II - FV + AI}{TA} \quad (7)$$

In the model, OP refers to operating profit, II denotes investment income, FV stands for income from changes in fair value, AI indicates investment income of associates and joint ventures.

The regression outcomes of model (5) are presented in column (1) of Table 7. The regression coefficient for digital finance (DIF) stands at −0.039, and this coefficient is statistically significant at the 1% significance level, suggesting that digital finance adversely affects the improvement of non-financial firms' future main business performance; Column (3) displays the regression results of model (6). In this column, the regression coefficient of DIF is −0.037, which is statistically significant at the 5% level. Similarly, the regression coefficient of Fin is −0.047, also significant at the 1% level; the results in Column (3) demonstrate the mediating role of financial investment in the process where digital finance inhibiting the future performance of firms' main business, i.e., the path of the hypotheses in this part is valid. In summary, digital finance will promote enterprise financial investment, thus negatively affecting the future performance of the enterprise's main business, which also shows that the enterprise's financial investment is mainly out of arbitrage motives, which is not conducive to the development of the enterprise's main business and hinders the enterprise's high-quality development.

APPENDIX A. SPECIFICATION OF VARIABLES

Variable symbol	Variable definition
Fin	Measurement Methodology 1: Proportion of Financial Assets to Total Assets
Fin1	Measurement Methodology 2: Proportion of Financial Assets to Total Assets
TS	Trading Securities
FD	Financial Derivative
LA	Loans and Advances
AS	Available for Sale
FA	Financial Assets
HMI	Held To Maturity Investments
NAIP	Net Amount of Investment Property
TA	Total Assets
DIF	City-Level Digital Inclusive Finance Index
DIF1	Provincial Digital Financial Inclusion Index
Lev	The ratio of total liabilities to total assets
Size	The natural logarithm of total assets
Share	The proportion of shares held by the first largest shareholder
Growth	The year-on-year growth rate of operating income
ROA	Return on Assets
CD	CEO Duality
IndeRatio	Proportion of Independent Directors
PGDP	Level of Per Capita GDP
Second	Proportion of Value Added of the Secondary Industry
Loan	Level of Financial Development
Internet	Internet Penetration Rate
Lev1	The ratio of long-term debt to shareholder equity
SA	Size-Age Index
MP	The firm's main business performance
P_MP	The company's next period's core business performance
OP	Operating Profit
II	Investment Income
FV	Income From Changes in Fair Value
AI	Investment Income of Associates and Joint Ventures

VI. CONCLUSION

A. CONCLUSIONS AND POLICY RECOMMENDATIONS

1) Conclusions of the Study

This study explores the effect of digital finance on real businesses, specifically analyzing its economic consequences on the main business performance of manufacturing firms through optimized capital allocation and technical upgrading. Following the outcomes of the empirical tests, we reach the subsequent conclusions.

(1) Digital finance promotes financial investment in real enterprises. To verify the robustness of this conclusion, subsequent studies conduct fourteen tests. The results confirm that digital finance promotes real enterprises' financial investment, which shows the credibility of the benchmark regression.

(2) The influence of digital finance on corporate financial investment shows considerable variation, contingent upon whether the firm is technology-intensive, whether the CEO possesses a financial background, and whether the firm operates in a high-pollution industry. The promotional impact is more evident in firms that are non-technology-intensive, enterprises led by CEOs without financial backgrounds, and companies within non-high-pollution industries.

(3) Mechanism analysis shows that digital finance reduces leverage by effectively alleviating the financing constraints faced by real firms, which facilitates their financial investment.

(4) Further analysis based on the intermediary utility model to explore the digital finance and promote financial investment in real enterprises will make impact on the performance of the enterprise's main business. The results show that digital finance promotes financial investment in real enterprises, yet this promotion effect exerts a detrimental influence on the core manufacturing performance of firms by diverting capital from technical innovation.

2) Policy Recommendations

We make the following policy recommendations. On the enterprise side, real enterprises should appropriately utilize the financing channels and investment opportunities expanded by digital finance, avoid blindly investing in financial assets, and prevent excessive financialization from damaging the performance of their main business. It is necessary to clarify the core status of the main business, allocate resources preferentially to the growth of the primary business, facilitate the profound integration of the digital economy and the physical economy, integrate digital finance into its own development strategy; optimise the allocation of assets under reasonable control of risks, for example, by using the digital financial platform to obtain more convenient and low-cost funds and use them in technology research and development, equipment updating, and other main business areas to boost the fundamental competitive edge of the business. This strengthens the fundamental competitive edge of businesses and fosters the high-standard development of the real economic sector. In addition, when making investment decisions, enterprises need to weigh the relationship between short-term results and long-term growth. This is to avoid the situation where they focus solely on short-term profit-seeking and overlook investments in their core business, such negligence can ultimately undermine the core competitiveness and long-term growth prospects of the enterprises.

The government should strengthen the regulation of the digital financial industry, closely monitor the dynamics and development trends of the digital financial market, timely assess the impact of new business models and products on financial stability and the real economy, modify regulatory guidelines and stipulations to guarantee the sound and well-organized growth of digital finance. At the same time, step up the supervision of real-economy enterprises, keep a close eye on the alterations in the distribution of corporate financial assets, prevent enterprises from overinvesting in financial assets, and promote the sustainable development of enterprises. Customized strategies ought to be devised and put into effect in accordance with the distinct features of businesses. For non-technology-intensive businesses, enhanced oversight of capital flows is essential to guide them in leveraging digital financial services to support their core operations and prevent excessive financialization. For enterprises led by CEOs without financial backgrounds, greater emphasis must be placed on financial literacy education and risk awareness campaigns to strengthen their ability

to identify and mitigate financial speculation risks. For non-heavily polluting enterprises, vigilance is warranted against their tendency to pursue excessive financialization by leveraging digital financial conveniences under relatively relaxed environmental regulatory pressures. Appropriate tax incentives or fiscal subsidies can be employed to guide their surplus funds toward green technology R&D and sustainable development initiatives. Finally, the government should encourage digital financial institutions to cooperate with the real economy, innovate financial service models, and develop digital financial products suitable for the characteristics of real enterprises. At the same time, the government can leverage policy instruments — such as tax incentives and targeted financial subsidies — to guide digital financial resources toward critical sectors and underdeveloped segments of the real economy, thereby fostering its sustainable, high-quality development.

AUTHOR CONTRIBUTIONS

Tianxiang Wang designed, collected and analyzed the data, and drafted the manuscript. Tianxiang Wang conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Tianxiang Wang participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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REFERENCES

- [1] M. Demertzis, S. Merler, and G. B. Wolff, "Capital markets union and the fintech opportunity," *Journal of financial regulation*, vol. 4, no. 1, pp. 157-165, 2018, doi: 10.1093/jfr/fjx012.
- [2] F. Guo, J. Wang, F. Wang, et al., "Measuring China's digital financial inclusion: Index compilation and spatial characteristics," *China economic quarterly*, vol. 19, no. 4, pp. 1401-1418, 2020, doi: 10.13821/j.cnki.ceq.2020.03.12.
- [3] D. Liu, Y. Jin, C. Pray, et al., "The Effects of Digital Inclusive Finance on Household Income and Income Inequality in China? Agricultural and Applied Economics Association," 2020, doi: 10.22004/ag.econ.304238.
- [4] Y. Mou, "The impact of digital finance on technological innovation across enterprise life cycles in China," *Heliyon*, pp. 10(14), 2024, doi: 10.1016/j.heliyon.2024.e33965.
- [5] L. Tian, W. Tian, J. Guo, et al., "Digital Finance and Corporate Leverage Manipulation: Evidence from China," *Journal of the Knowledge Economy*, pp. 1-26, 2024, doi: 10.1007/s13132-024-02187-2.
- [6] Y. Ren, X. Liu, and Y. Zhu, "Can the development of digital finance and information transparency improve enterprise investment efficiency? *Finance Research Letters*," 2025; 73: 106597, doi: 10.1016/j.frl.2024.106597.
- [7] P. Yue, A. G. Korkmaz, Z. Yin, et al., "The rise of digital finance: Financial inclusion or debt trap? *Finance Research Letters*," 2022; 47: 102604, doi: 10.1016/j.frl.2021.102604.

- [8] N. Peng, M. Wen, X. Tian, et al., "The impact of digital finance on firm's inefficient investment: Evidence from Chinese A-share listed companies," *Finance Research Letters*, vol. 69, Art. no. 106118, 2024, doi: 10.1016/j.frl.2024.106118.
- [9] C. Zhou and S. Qi, "Does green finance restrain corporate financialization? *Environmental Science and Pollution Research*, " vol. 30, no. 27, pp. 70661-70670, 2023, doi: 10.1007/s11356-023-27476-2.
- [10] X. Gao and Y. Ren, "The impact of digital finance on SMEs financialization: Evidence from thirty million Chinese enterprise registrations," *Heliyon*, pp. 9(8), 2023, doi: 10.1016/j.heliyon.2023.e18664.
- [11] Y. Feng, M. Meng, and G. Li, "Impact of digital finance on the asset allocation of small-and medium-sized enterprises in China: Mediating role of financing constraints," *Journal of Innovation & Knowledge*, vol. 8, no. 3, Art. no. 100405, 2023, doi: 10.1016/j.jik.2023.100405.
- [12] J. W. Sun and Y. Shen, "How can digital finance affect the investment of entity enterprises: heterogeneity characteristics, mechanism test and motivation analysis," *Modern Economic Research*, vol. 477, no. 9, pp. 56-68, 2021, doi: 10.13891/j.cnki.mer.2021.09.007.
- [13] Q. Xu, Q. Cao, and L. Wang, "Digital inclusive finance and digital transformation of Chinese enterprises: Perspectives on company technology intensity and financialization," *Economics & Politics*, vol. 37, no. 1, pp. 442-486, 2025, doi: 10.1111/ecpo.12326.
- [14] C. Zhang and N. Zheng, "Monetary policy and financial investments of nonfinancial firms: New evidence from China," *China Economic Review*, vol. 60, Art. no. 101420, 2020, doi: 10.1016/j.chieco.2020.101420.
- [15] D. Yang, H. Ma, K. C. Ho, et al., "Digital finance and corporate financialization: from the perspective of bank competition and economic policy uncertainty," *Applied Economics Letters*, pp. 1-5, 2024, doi: 10.1080/13504851.2024.2363984.
- [16] X. Xu and C. Xuan, "A study on the motivation of financialization in emerging markets: The case of Chinese nonfinancial corporations," *International Review of Economics & Finance*, vol. 72, pp. 606-623, 2021, doi: 10.1016/j.iref.2020.12.026.
- [17] T. Lagoarde-Segot, "Financialization: Towards a new research agenda," *International Review of Financial Analysis*, vol. 51, pp. 113-123, 2017, doi: 10.1016/j.irfa.2016.03.007.
- [18] G. Markarian, L. Pozza, and A. Prencipe, "Capitalization of R&D costs and earnings management: Evidence from Italian listed companies," *The International Journal of Accounting*, vol. 43, no. 3, pp. 246-267, 2008, doi: 10.1016/j.intacc.2008.06.002.
- [19] L. Yao and X. Yang, "Can digital finance boost SME innovation by easing financing constraints?: Evidence from Chinese GEM-listed companies," *Plos one*, vol. 17, no. 3, Art. no. e0264647, 2022, doi: 10.1371/journal.pone.0264647.
- [20] T. Theurillat, J. Corpataux, and O. Crevoisier, "Property sector financialization: The case of Swiss pension funds (1992– 2005)," *European Planning Studies*, vol. 18, no. 2, pp. 189-212, 2010, doi: 10.1080/09654310903491507.
- [21] W. Mu, K. Liu, Y. Tao, E. S. G. Digital finance and corporate, et al., "Finance Research Letters," 2023; 51: 103426, doi: 10.1016/j.frl.2022.103426.
- [22] A. Kliman and S. D. Williams, "Why 'financialisation' hasn't depressed US productive investment," *Cambridge Journal of Economics*, vol. 39, no. 1, pp. 67-92, 2015, doi: 10.1093/cje/beu033.
- [23] Q. H. Huang, "On the development of China's real economy at the new stage," *China Industrial Economics*, vol. 9, pp. 5-24, 2017, doi: 10.19581/j.cnki.ciejournal.2017.09.001.
- [24] Y. Du, H. Zhang, and J. Y. Chen, "The impact of financialization on future development of real enterprises' core business: promotion or inhibition," *China industrial economics*, vol. 12, no. 1, pp. 113-131, 2017, doi: 10.19581/j.cnki.ciejournal.20171214.007.
- [25] Y. C. Peng, X. R. Ni, and J. Shen, "The effect of transforming the economy from substantial to fictitious on financial market stability: An analysis on stock price crash risk," *Economic Research Journal*, vol. 53, no. 10, pp. 50-66, 2018, doi: CNKI: SUN: JJYJ.0.2018-10-005.
- [26] Y. Q. Feng, H. L. Zhang, and J. Ni, "Motivations for investment in financial assets of entity enterprises: Heterogeneous impacts of monetary policy and moderating effects of digital finance," *China Ind. Econ*, vol. 2, pp. 118-136, 2024, doi: 10.19581/j.cnki.ciejournal.2024.02.007.
- [27] T. Jiang, "Mediating effects and moderating effects in causal inference," *China Industrial Economics*, vol. 5, pp. 100-120, 2022, doi: 10.19581/j.cnki.ciejournal.2022.05.005.
- [28] T. J. Bartik, "Who benefits from state and local economic development policies? 1991,".
- [29] P. Goldsmith-Pinkham, I. Sorkin, and H. Swift, "Bartik instruments: What, when, why, and how," *American Economic Review*, vol. 110, no. 8, pp. 2586-2624, 2020, doi: 10.1257/aer.20181047.
- [30] E. Oster, "Unobservable selection and coefficient stability: Theory and evidence," *Journal of Business & Economic Statistics*, vol. 37, no. 2, pp. 187-204, 2019, doi: 10.1080/07350015.2016.1227711.
- [31] T. Zhong, Y. Duan, and Z. Ding, "How bankruptcy system innovation affects firm investment behavior: A quasi-natural experiment based on the establishment of bankruptcy courts in China," *International Review of Financial Analysis*, vol. 96, Art. no. 103723, 2024, doi: 10.1016/j.irfa.2024.103723.