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The Promoting Role of Digital Inclusive Finance in the Innovation Transformation of Micro and Small Enterprises

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Abstract. To comprehend the role of digital inclusive finance (DIF) in facilitating the innovation transformation of Micro and Small Enterprises (MSEs), this study endeavors to establish a theoretical framework incorporating the Long Tail Theory, Financial Development Theory, and Information Asymmetry Theory. Employing a fixed-effects model, the study delves into the impact of DIF on the innovation transformation of MSEs. The findings suggest that DIF significantly mitigates the financing constraints faced by MSEs, thereby fostering their innovation transformation. This study bears both theoretical and practical significance in enhancing the understanding of the mechanism through which DIF promotes the innovation development of MSEs, while also providing a foundational reference for pertinent policy formulation.

Keywords: Digital Inclusive Finance; Micro and Small Enterprises; Innovation Transformation; Fixed Effects Model; Mediation Effects Model.

1. Introduction

In the current economic environment, Micro and Small Enterprises (MSEs) play an irreplaceable role in promoting economic growth, employment, and driving innovation. However, compared to large enterprises, MSEs often face challenges such as difficulty accessing financing and high financing costs, which constrain their development and innovation capabilities. Particularly within the traditional financial system, due to factors such as information asymmetry and high costs, many MSEs struggle to obtain suitable financing support, limiting their abilities in technological upgrades, product innovation, and market expansion. Simultaneously, amidst the swift advancement of digital technology, Digital Inclusive Finance (DIF) has emerged as a consequential financial modality, progressively serving as a viable remedy to confront the financing obstacles encountered by MSEs [1,2].

DIF, characterized as a pioneering paradigm in financial services, predominantly leverages internet infrastructure, big data analytics, artificial intelligence, and other cutting-edge technologies to pioneer financial products and services. Its overarching objective is to furnish MSEs with enhanced convenience, adaptability, and bespoke financing solutions. DIF not only expands the financing channels for MSEs and breaks through the geographical constraints of traditional financial institutions but also lowers the financing threshold, enabling more enterprises traditionally unable to access financing support to benefit [3]. Furthermore, the application of DIF significantly enhances the efficiency and transparency of the financing process. Through data analysis and intelligent risk control technology, it effectively reduces the financing application cycle, accelerates fund circulation speed, and enables enterprises to more timely meet their business needs [4]. This innovative financial framework not only efficiently mitigates the financing hurdles encountered by MSEs but also affords them expanded avenues for development, consequently fostering the innovation transformation and enduring sustainability of enterprises [5].

In order to enhance understanding of the catalytic function of DIF in MSEs' innovation transformation, this study formulates a theoretical framework grounded in the Long Tail Theory, Financial Development Theory, and Information Asymmetry Theory. Through the establishment of a fixed-effects model, the study analyzes the influence of DIF on MSEs' innovation transformation. The

novelty of this study lies in its integrated utilization of the Long Tail Theory, Financial Development Theory, and Information Asymmetry Theory to develop the theoretical framework, thereby elucidating the impact mechanism of DIF on MSEs' innovation transformation. By organically combining these theories, this study deeply analyzes the promoting role of DIF in innovation for MSEs from different perspectives, providing new ideas and methods for understanding and addressing the financing challenges faced by MSEs. Additionally, through empirical analysis using the fixed-effects model, the study further quantifies the impact of DIF on the innovation transformation of MSEs, providing a scientific basis for relevant policy formulation. This comprehensive approach, combining multiple theories with empirical analysis, demonstrates strong innovation and practicality.

2. Literature Review

Amidst the swift advancement of digital technology, there is a growing body of domestic and international research investigating the influence of DIF on enterprise innovation transformation. Leong et al. (2022) postulated in their study that the evolution of DIF had facilitated the innovation transformation of MSEs in China, particularly by enhancing the accessibility and adaptability of financial services [6]. Similarly, Sun and You (2023) illustrated that the proliferation of DIF platforms offered enterprises enhanced access to convenient financing channels, consequently fostering their transition and upgradation [7]. Babilla (2023) constructed a dynamic evaluation model using quarterly data from the West African Monetary Union from the second quarter of 1986 to the first quarter of 2022. Empirical analysis confirmed the positive role of DIF in enterprise innovation transformation. Digital innovation can enhance MSEs' financing channels by alleviating financial frictions caused by collateral and lending restrictions [8]. Dai et al. (2023) proposed that the promotion of DIF platforms not only improved the financing environment for enterprises but also provides them with more innovation opportunities [9]. Su et al. (2023) discovered through empirical research that DIF played an important role in reducing financing barriers, improving financing efficiency, and stimulating innovation incentives [10].

In summary, both domestic and international scholars have delved into the impact mechanism of DIF on enterprise innovation transformation, albeit with a primary focus on MSEs, thereby lacking a comprehensive understanding of the impact mechanism on micro-enterprises. The strength of this study lies in its holistic application of the Long Tail Theory, Financial Development Theory, and Information Asymmetry Theory to construct a theoretical framework. Furthermore, the utilization of fixed-effects models for empirical analysis enables a comprehensive exploration of the impact of DIF on the innovation transformation of micro-enterprises from various perspectives. Through this integrated research approach, a more nuanced understanding of the mechanism of DIF is attained, thereby furnishing theoretical underpinnings and empirical substantiation for the formulation of relevant policies.

3. Research Methodology

3.1. DIF

DIF is a way of providing financial services to low-income individuals and MSEs using digital technology and innovative financial models. It mitigates the expenses and entry barriers associated with financial services, broadens the reach of financial services, and fosters financial inclusivity and economic advancement by leveraging technologies such as the internet, mobile payments, and big data analysis. DIF includes forms such as mobile payments, peer-to-peer (P2P) network lending, digital credit, internet finance, etc., and has become an important means to promote financial inclusion and digital transformation [11,12].

3.2. MSEs

MSEs refer to businesses with small scale and relatively weak financial strength, typically composed of few personnel, with a relatively narrow scope of operations, and are at a relatively disadvantaged position in the market competition. These enterprises play an important role in economic activities; they are not only an essential component of economic development but also a significant force in promoting employment, driving innovation, and increasing national economic income. Due to their flexibility and innovativeness, MSEs play an increasingly important role in the market economy, becoming a key driving force for economic growth and social development [13,14].

3.3. Long Tail Theory

The Long Tail theory describes a phenomenon and pattern of commodity sales distribution in the digital economy. This theory suggests that, compared to traditional retail models, in a digital environment, products in the market exhibit a characteristic known as the long tail distribution. While the sales volume of popular products remains significant, the total sales volume of a large number of niche products in the long tail segment can surpass that of popular products. This implies that through digital platforms, consumers can more easily access a diverse range of products to meet personalized and specific needs, which may not be found in traditional retail channels [15].

The application of the Long Tail theory in the digital economy is not limited to commodity sales and can also encompass industries such as content production and the service sector. It guides many enterprises and platforms to adopt more personalized and diversified business strategies to gain competitive advantages by meeting the long-tail demand. The proposition of the Long Tail theory provides important insights and theoretical foundations for marketing and product strategies in the digital age [16]. The Long Tail effect in financial markets is illustrated in Figure 1 [17].

Distribution	Explanation	Centre
Short hair	Low number of companies, high volume of financial products traded	Demand for mainstream financial products by state-owned enterprises and large listed companies
Long tail	High number of enterprises and low volume of financial products traded	Individualised and differentiated demand for financial products by micro, small and medium-sized and private enterprises

Figure 1. Long Tail Effect in Financial Markets

3.4. Financial Development Theory

Financial development theory is an economic theory that emphasizes the importance of the financial system in economic growth and development. This theory suggests that a developed financial system can enhance the efficiency of fund allocation, facilitate the flow of resources to industries and projects with potential, thereby driving economic growth. Additionally, a sound financial system can effectively manage risks, reduce investment uncertainty, and incentivize enterprises to engage in more investment and innovation activities. Financial development also helps improve the efficiency of resource allocation, facilitating the flow of funds from savers to investors, accelerating capital formation, and economic growth. Most importantly, a developed financial system can provide more financial support and venture capital for innovation and entrepreneurship, driving the emergence of new technologies, products, and businesses, thereby promoting dynamic changes and growth in the economy [18,19].

3.5. Information Asymmetry Theory

Information asymmetry theory is an economic theory that emphasizes the presence of information asymmetry between buyers and sellers in economic transactions, wherein one party possesses more information than the other. This information asymmetry may lead to market failure and inefficient resource allocation problems. In situations of information asymmetry, sellers may exploit their informational advantage to obtain higher prices or unfavorable transaction conditions unfairly or fraudulently. Buyers, due to inadequate information, may be unable to accurately assess the value of products or services, leading to irrational decision-making. This information asymmetry exists not only in product markets but also in financial markets and labor markets, among other areas [20].

3.6. Research Hypotheses

Hypothesis 1: DIF has a positive impact on the innovation transformation of MSEs.

Initially, DIF disrupts the temporal and spatial constraints inherent in conventional financial services by utilizing digital technologies, thus furnishing MSEs with enhanced convenience and efficacy in financial transactions. Subsequently, DIF has the capacity to diminish the barriers to entry and expenses associated with financial services, thus broadening the accessibility of financial services to a larger pool of MSEs, consequently facilitating the acquisition of financial backing requisite for innovation transformation. Lastly, DIF can furnish MSEs with more refined and tailored financial services by harnessing technologies such as big data and cloud computing, thereby expediting their innovation transformation endeavors.

Hypothesis 2: Financial constraints mediate the impact of DIF on the innovation transformation of MSEs.

MSEs often face severe financial constraints, limiting their ability and speed of innovation transformation. DIF, by providing convenient and low-cost financing channels, can alleviate the financial constraints of MSEs. When the financial constraints of MSEs are alleviated, they have more funds and resources to invest in innovation transformation, thereby enhancing the success rate and effectiveness of innovation transformation.

The impact mechanism of DIF on the innovation transformation of MSEs is illustrated in Figure 2.

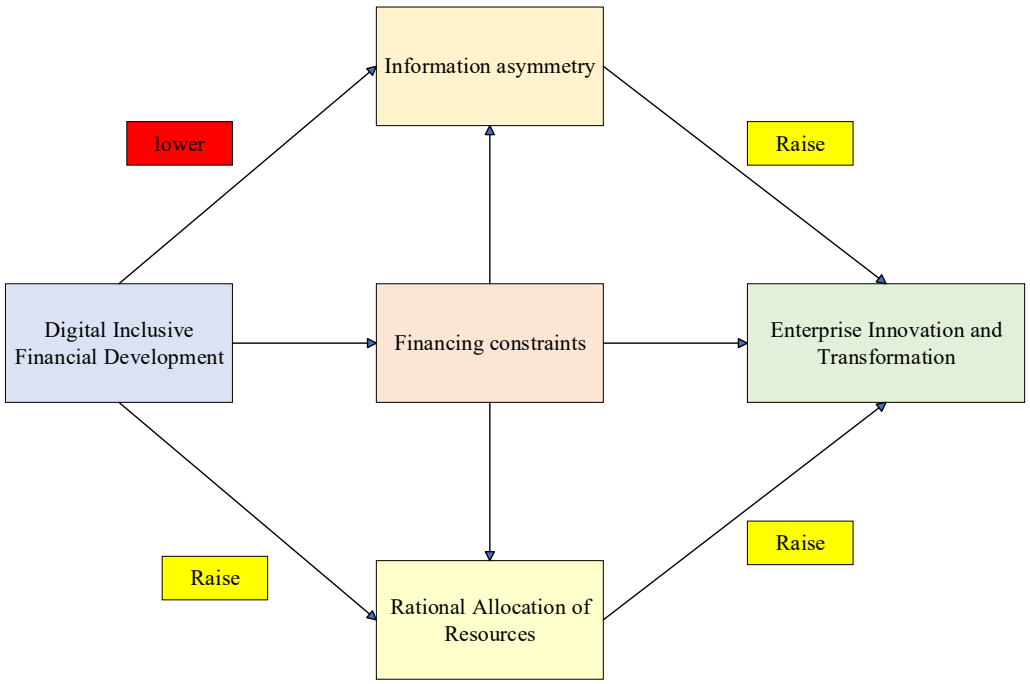

Figure 2. Mechanism of the Impact of DIF on the Innovation Transformation of MSEs

3.7. Constructing the Fixed Effects Model

Constructing a fixed effects model is a commonly used method in panel data analysis for exploring relationships between variables. In this study, when investigating the impact of DIF on the innovation transformation of MSEs, a fixed effects model is employed to analyze hypothesis 1.

Let $IT_{i,t}$ represent the innovation transformation capability of enterprises, $DFII_{j,t}$ denote the DIF index, $CON_{j,t}$ stand for control variables, Y represent the year, and P represent the province. Then, the calculation of the innovation transformation capability of enterprises is as shown in Equation (1) [21]:

$$IT_{i,t} = \varphi_0 + \alpha_1 DFII_{j,t} + \gamma_2 CON_{j,t} + \sum Y + \sum P + \epsilon \quad (1)$$

In Equation (1), φ_0, α_1, and γ_2 represent regression coefficients, ϵ denotes the random error, i stands for the enterprise, t represents the year, and j denotes the province.

To verify research hypotheses 2 and 3, this study constructs a mediation effects model. Firstly, two simple regression models are established: one model takes DIF as the independent variable and financial constraints as the dependent variable to verify hypothesis 2; another model considers financial constraints as the independent variable and the innovation transformation of MSEs as the dependent variable to verify hypothesis 3. The computation of the mediation effects model is shown in Equations (2) and (3) [22,23]:

$$FC_{i,t} = \varphi_0 + \alpha_1 DFII_{j,t} + \gamma_2 CON_{j,t} + \sum Y + \sum P + \epsilon \quad (2)$$

$$IT_{i,t} = \varphi_0 + \alpha_1 DFII_{j,t} + \gamma_2 CON_{j,t} + \delta_2 FC_{j,t} + \sum Y + \sum P + \epsilon \quad (3)$$

In Equations (2) and (3), $FC_{i,t}$ represents financial constraints, and δ_2 denotes the regression coefficient.

4. Experimental Design and Performance Evaluation

4.1. Datasets Collection

Variant	Variable symbols	Variable explanation
Innovative transformation	IT	The capacity of enterprises to innovate and transform.
Digital Financial Inclusion Index	DFII	An indicator to assess the extent and feasibility of digital financial penetration in a country.
Degree of digitisation	AOD	Refers to the extent to which firms have adopted digital technologies.
Depth of Use	DOU	Actual number of users, number of transactions per capita and transaction amount per capita.
Breadth of Coverage	BOC	The number of Internet payment accounts and the number of bank accounts tied to them.
Financing constraints	FC	Refers to the various restrictions and limitations imposed on enterprises in the process of financing.
Gearing Ratio	GR	The total liabilities of a business compared to its total assets.
Return on assets	ROA	The overall profitability of all assets of an enterprise including net assets and liabilities.
Operating Income	OI	Refers to the monetary income earned by a business over a given period of time.
Capital Concentration	CC	Refers to the degree of concentration of capital in different industries, regions or among enterprises.
Enterprise Size	ES	It refers to the degree of concentration of labour, means of production and products in an enterprise.

Figure 3. Definition of Research Variables

The data for this study are collected from multiple databases, including the China Micro Enterprise Survey (CMES) database and the National Bureau of Statistics. These databases provide rich information about MSEs, covering aspects such as enterprise scale, industry distribution, operational status, and financing needs. By leveraging these databases, the study gains insights into the overall situation of MSEs in China, as well as their demands and challenges in the development of DIF. This provides crucial data support for investigating the impact of DIF on the innovation transformation of MSEs. The study selects MSEs from 2017 to 2022 as the research objects, collecting data from 108 samples, with 721 observations. The explanatory variables are selected from the DIF Index released by the Peking University Financial Research Center from 2011 to 2020. The dependent and intermediate variables are chosen from the Wind database and the China Stock Market & Accounting Research Database (CSMAR).

The definitions of the research variables are shown in Figure 3.

4.2. Performance Evaluation

The correlation test results of DIF on the innovation transformation of MSEs are shown in Figure 4.

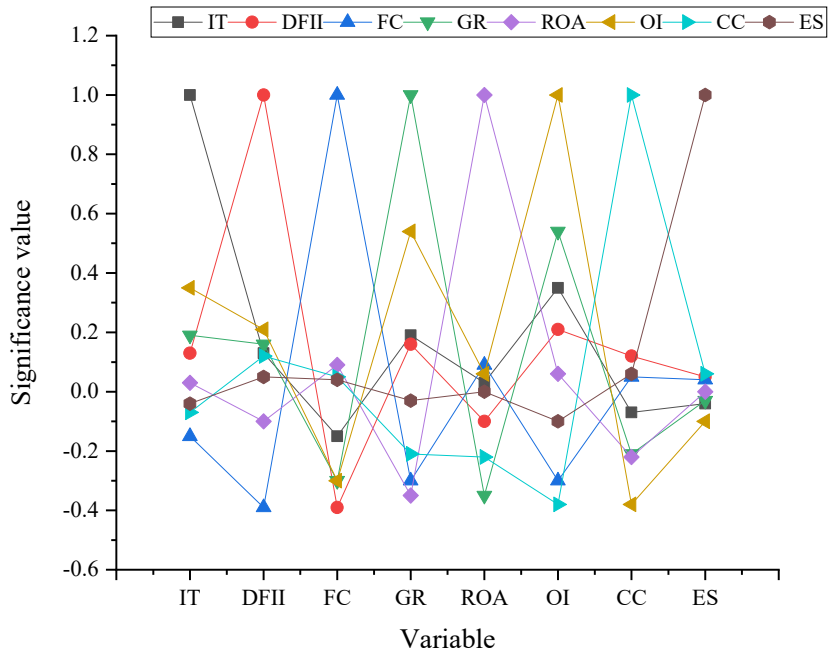

Figure 4. Correlation Test Results of DIF on the Innovation Transformation of MSEs

In Figure 4, the correlation coefficient between innovation transformation and the DIF index stands at 0.13, denoting a discernible degree of positive correlation between the two variables, thus affirming hypothesis 1. Conversely, the correlation coefficient between innovation transformation and financial constraints registers at -0.15, indicating an adverse correlation. This implies that financial constraints exert a suppressive influence on the innovation transformation of MSEs; the more pronounced the financial constraints, the greater the impediment to innovation transformation for MSEs. Additionally, the correlation coefficient between the DIF index and financial constraints is recorded at -0.39, highlighting a robust negative correlation. These findings suggest that the advancement of DIF aids in mitigating the financial constraints faced by MSEs, thereby furnishing them with increased financing prospects and avenues.

The outcomes of the mediation effect test pertaining to the impact of DIF on the innovation transformation of MSEs through financial constraints are delineated in Figure 5.

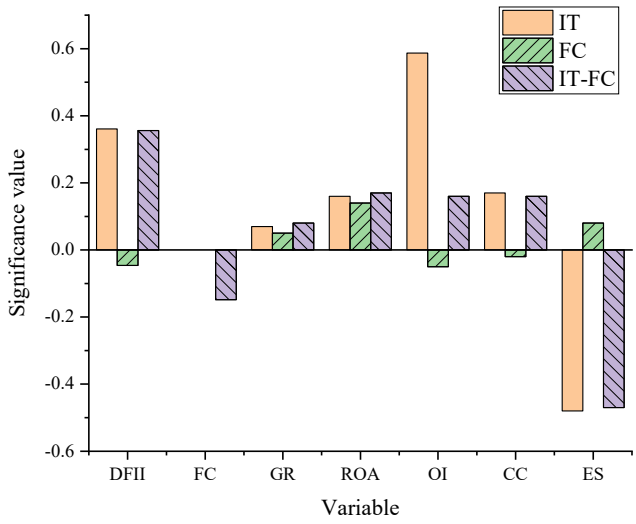

Figure 5. Test Results of the Mediating Effect of Financial Constraints in the Impact of DIF on the Innovation Transformation of MSEs

Within Figure 5, a positive correlation is observed between the DIF index and innovation transformation, showcasing a regression coefficient of 0.361. This empirical evidence underscores the fostering impact of DIF development on the innovation transformation of MSEs. Concurrently, a negative correlation is identified between the DIF index and financial constraints, with a regression coefficient of -0.046, thus providing additional validation of DIF's potential to ameliorate the financial constraints experienced by MSEs. In scrutinizing the mediating effect of financial constraints, the regression coefficient between financial constraints and innovation transformation is measured at -0.148. The data indicate that financial constraints have a negative impact on innovation transformation; the greater the financial constraints, the greater the difficulty in innovation transformation, confirming hypothesis 2.

5. Conclusion

This study integrates the Long Tail Theory, Financial Development Theory, and Information Asymmetry Theory to establish a robust theoretical framework, with the objective of elucidating the mechanism by which DIF influences the innovation transformation of MSEs. Utilizing a fixed-effects model, this study effectively manages potential confounding variables, thus providing a more precise assessment of the impact of DIF. The findings of the study affirm the beneficial effect of DIF on the innovation transformation of MSEs. Furthermore, financial constraints are identified to serve as an intermediary factor in this process; DIF indirectly fosters innovation transformation by mitigating the financial constraints encountered by MSEs. One limitation of this study lies in the possibility of incomplete data collection and processing, as well as the lack of comprehensive exploration of other potential mediating variables or mechanisms. Future research should further improve and deepen in these aspects.

References

[1] Xiong M, Li W, Xian B T S, et al. Digital inclusive finance and enterprise innovation—Empirical evidence from Chinese listed companies[J]. Journal of Innovation & Knowledge, 2023, 8(1): 100321.

[2] Liang C, Du G, Cui Z, et al. Does digital inclusive finance enhance the creation of county enterprises? Taking Henan Province as a case study[J]. Sustainability, 2022, 14(21): 14542.

[3] Li J, Li B. Digital inclusive finance and urban innovation: Evidence from China[J]. Review of Development Economics, 2022, 26(2): 1010-1034.

[4] Guo B, Feng Y, Lin J. Digital inclusive finance and digital transformation of enterprises[J]. Finance Research Letters, 2023, 57(1): 104270.

[5] Li Z, Zhu J, He J. The effects of digital financial inclusion on innovation and entrepreneurship: A network perspective[J]. Electron. Res. Arch, 2022, 30(1): 4697-4715.

[6] Leong C, Tan F T C, Tan B, et al. The emancipatory potential of digital entrepreneurship: A study of financial technology-driven inclusive growth[J]. Information & Management, 2022, 59(3): 103384.

[7] Sun Y, You X. Do digital inclusive finance, innovation, and entrepreneurship activities stimulate vitality of the urban economy? Empirical evidence from the Yangtze River Delta, China[J]. Technology in Society, 2023, 72(1): 102200.

[8] Babilla T U K. Digital innovation and financial access for small and medium-sized enterprises in a currency union[J]. Economic Modelling, 2023, 120(1): 106182.

[9] Dai D, Fu M, Ye L, et al. Can Digital Inclusive Finance Help Small-and Medium-Sized Enterprises Deleverage in China?[J]. Sustainability, 2023, 15(8): 6625.

[10] Su R, Zheng T, Zhong Y, et al. Role of digital inclusive finance for high-quality business development: A study of China's "five development concept" policy[J]. Sustainability, 2023, 15(15): 12078.

[11] Wang W, He T, Li Z. Digital inclusive finance, economic growth and innovative development[J]. Kybernetes, 2023, 52(9): 3064-3084.

[12] Fersi M, Boujelbéne M, Arous F. Microfinance's digital transformation for sustainable inclusion[J]. European Journal of Management and Business Economics, 2023, 32(5): 525-559.

[13] Li S, Gao L, Han C, et al. Exploring the effect of digital transformation on Firms' innovation performance[J]. Journal of Innovation & Knowledge, 2023, 8(1): 100317.

[14] Pyoko O M, Akims M A, Nyachae S M, et al. Evaluating the Nexus between Digital Transformation and Financial Inclusion: A Fresh Insight from Small and Medium Enterprises in Kenya[J]. Asian Research Journal of Arts & Social Sciences, 2023, 21(4): 64-71.

[15] Wang J, Wang X, Shen T, et al. Parallel vision for long-tail regularization: Initial results from IVFC autonomous driving testing[J]. IEEE Transactions on Intelligent Vehicles, 2022, 7(2): 286-299.

[16] Yang L, Jiang H, Song Q, et al. A survey on long-tailed visual recognition[J]. International Journal of Computer Vision, 2022, 130(7): 1837-1872.

[17] Cui J, Liu S, Tian Z, et al. Reslt: Residual learning for long-tailed recognition[J]. IEEE transactions on pattern analysis and machine intelligence, 2022, 45(3): 3695-3706.

[18] Çetin M, Sarıgül S S, Işık C, et al. The impact of natural resources, economic growth, savings, and current account balance on financial sector development: Theory and empirical evidence[J]. Resources Policy, 2023, 81(1): 103300.

[19] Ha N M, Hoang Ngoc B, Vo D H. Does financial development affect human capital? Evidence from Vietnam[J]. Journal of Asia Business Studies, 2023, 17(4): 785-803.

[20] Bergh D D, Ketchen Jr D J, Orlandi I, et al. Information asymmetry in management research: Past accomplishments and future opportunities[J]. Journal of management, 2019, 45(1): 122-158.

[21] Plümper T, Troeger V E. Not so harmless after all: The fixed-effects model[J]. Political Analysis, 2019, 27(1): 21-45.

[22] Anwar M, Nidar S R, Komara R, et al. Rural bank efficiency and loans for micro and small businesses: evidence from West Java Indonesia[J]. International Journal of Emerging Markets, 2020, 15(3): 587-610.

[23] Amamou R, Gereben A, Wolski M. Assessing the impact of the EIB's intermediated lending to SMEs during funding shocks[J]. Small Business Economics, 2023, 60(3): 975-1007.