

The Impact of Financial Innovation on China's Provincial Economic Resilience

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Abstract. Financial innovation's impact on the socio-economic resilience cannot be disregarded in the context of the ongoing pursuit of innovation. This study employs a variety of econometric models, including the moderating effect and the mediating effect, to experimentally assess the relationship between financial innovation and economic resilience. The study's findings show that: financial innovation can significantly boost a province's economic resilience; the proportion of state-owned enterprises mitigates the benefits of financial innovation for economic resilience; and improving industrial structure and market activity are two ways that financial innovation boosts economic resilience. Thus, the research in this paper promotes the understanding of the development effect of financial innovation and provides a reference for the path of economic resilience enhancement.

Keywords: financial innovation, economic resilience, moderating effect, intermediation effect

1. Introduction

In recent years, the COVID-19 and other factors contributing to international instability have had a significant impact on China's economic development. Thanks to the strong resilience of the Chinese economy, the economy has maintained a positive momentum despite the tremendous pressure brought by changes in the domestic and international economic environment. Strong economic resilience is based on effective resource management, and finance is the key to maximizing social resource allocation. Financial innovation has the potential to meet the society's diverse financing needs, support the real economy financially, and promote the economy's healthy growth. To encourage the high-quality development of China's economy, it is therefore crucially important to investigate how financial innovation affects economic resilience. Most of the earlier research, which lacked many empirical analyses, concentrated on how the digital economy affected economic resilience. From a new perspective and from the perspective of financial innovation, this paper takes 31 provinces and cities in China (except Hong Kong, Macao and Taiwan) as the research object, and tries to explore the effect and mechanism of financial innovation on economic resilience through empirical analysis.

2. Literature Review

The term "resilience" was first conceptualized by Holling in the field of ecology and was originally used to describe the ability of a system to maintain its original agency and capacity after a shock^[1], while economic resilience was a concept first introduced by Reggiani, Graff and Nijkamp in 2002^[2]. The current concept of economic resilience refers to the stable ability of how an economic system recovers and reorganizes in response to shocks and losses^[3]. There is not yet a unified standard for the measurement of economic resilience. Feng Yuan and Nie Changfei (2020) and others divide economic development into resistance and recovery periods from the time level and use them to measure economic resilience^[4]. Zhang Junwei and Jiang Xia (2019) constructed an evaluation system of economic resilience by selecting indicators from four aspects: economic stability, economic structural diversification, economic innovation capacity and economic system vitality^[5]. And different scholars have different insights and views on the influencing factors of economic resilience. Xu Yuan and Zhang Linling (2019) took the industrial structure as the research perspective and confirmed that the economic resilience of large cities with diversified industrial structures is stronger^[6]. Zeng, Bing (2018) found that institutional capacity, technology level, infrastructure, and quality of life have a significant role in enhancing economic resilience through the study^[7]. Hu Yan

(2022) and others found that the development of digital economy can significantly improve economic resilience based on empirical studies^[8].

Finance is the core of the modern economy, and financial innovation has gradually become an important landing point for the long-term development of the financial industry. Financial innovation is constantly promoting the development of China's economy and the change of industrial structure. The impact of financial innovation in the study of the impact of financial innovation^[9], most scholars have focused on the role and path of financial innovation on economic growth. Zhou Qiang (2021) highlights this characteristic of the region and proposes to reform the financial system, technology and market to promote the economy and finance in a good state of coexistence^[10]. Wang Can (2019) argues that the relationship between financial innovation and economic growth is not a simple causal relationship and reveals the interdependence of the two systems based on a coupled coordination model^[11]. In terms of the measurement of financial innovation, related studies are relatively lacking. Mu Niyi (2009) introduced a gray prediction model to predict the level of financial innovation introduced a gray prediction model to predict the level of financial innovation^[12]. Mao Ke (2009) constructed a financial innovation index system to measure financial innovation from four dimensions: technical capability, management capability, market growth, and innovation environment^[13].

Combined with the above review, the current measurement of economic resilience, influencing factors and the mechanism of the role of financial innovation have been relatively well established, but no scholars have yet conducted research on the impact of financial technology on economic resilience. Based on this, this paper will analyze the impact of financial innovation on economic resilience in depth based on the world of moderating effect and mediating effect, and construct an econometric model using Chinese provincial panel data from 2010-2019 to empirically study the relationship between the two.

3. Theoretical Mechanisms

3.1 The direct impact of financial innovation on economic resilience

The use of new instruments under financial innovation will increase the variety of transactions available on the financial market, which in turn can lower transaction costs and average costs, spur more transactions, and grow economic aggregates. Financial innovation can also speed up the market's response to price changes and thus promote the efficiency of economic operation and the utilization rate of production factors, which also promotes the rise of economic aggregates and the stable adjustment of industrial structure, which are the keys to the resistance and resilience of economic resilience. These factors also provide a solid foundation for the adaptability and transformation of economic structure. Based on the above research findings, this paper proposes research hypothesis 1.

H1: Financial innovation has a significant positive contribution to economic resilience.

3.2 Moderating effect of SOE share on the relationship between financial innovation and economic resilience

The state-owned economy has been the dominant force in the national economy and plays an important role in the process of economic development. From the perspective of economic transformation, the reform and development of the state-owned economy are conducive to reducing the cost of reform and transformation and can improve the economic resilience transformation force. From the standpoint of efficiency alone, the massive state-owned economy of today will drag down the entire national economy due to the loss of efficiency and slow down economic development (Liu, Ruiming, 2011)^[14]. In terms of efficiency alone, today's large SOEs will slow down economic development due to their efficiency loss and have a drag effect on the national economy as a whole (Liu, R., 2011), thus reducing the resistance and adaptability of economic resilience; from a multidimensional perspective such as long-term social benefits and long-term economic growth, a higher proportion of SOEs is conducive to long-term growth and tends to offset the adverse effects

of recession at the regional level (Qi, H., 2020)^[15]. When it comes to stages of development, SOEs play a stage-specific role in promoting stable economic growth in the early stages of economic growth. As the economy matures, the share of SOEs gradually declines before stabilizing and tending to increase (Longkun, 2021)^[16]. Based on the above findings and the current situation of SOEs and economic level development in China, this paper proposes research hypothesis 2.

H2: The share of SOEs plays a negative role in the impact of financial innovation on economic resilience.

3.3 Indirect effects of financial innovation on economic resilience

1. Industry structure upgrade channel

Under the new circumstances, China's industrial structure is continuously optimized, and the proportion of tertiary industry gradually surpasses that of secondary industry. Additionally, financial innovation can boost the effectiveness of savings and investment transformation while also enhancing the economic environment. Financial institutions can have an impact on the market's capital allocation and flow by directing capital away from inefficient sectors and toward sectors with strong growth potential. They can also alter the distribution of production factors to ultimately optimize and upgrade the industrial structure. Financial innovation improves financial instruments, encourages capital transfer and concentration, and speeds up the modernization of industrial structure. At the same time, modernizing an economy's industrial structure can help it better manage risk. Financial innovation encourages deep industry servitization and informatization, which helps the sector take effective action when shocks occur and minimize economic losses. This is the basis for the region to maintain good economic resilience. This paper suggests research hypothesis 3 considering the research findings.

H3: Financial innovation contributes positively to economic resilience by improving the promotion of industrial structure upgrading.

2. Market activity Channel

The development of financial innovation has led to the emergence of new models and business models that require pairs. At the macro level, financial development is one of the six factors affecting the entrepreneurial activity of the market (Du Yunzhou, 2020)^[17]. Financial innovation has increased the financial market's ability to compete, created convenient conditions for individual entrepreneurship, and partially resolved the issue of "difficult and expensive financing." The more active the market is, the easier it is to stimulate the vitality of market players. Under this opportunity, many entrepreneurs will emerge, and private economies will enter the market, promoting effective market competition and making the economy full of vitality and resilience. At the same time, the new economy can quickly grow the market while also eliminating outmoded production sectors from the competition. Additionally, these new production sectors frequently have a competitive advantage and can respond quickly to shocks. Based on the above conclusions, this paper proposes research hypothesis 4.

H4: Financial innovation can contribute positively to economic resilience by driving market activity.

4. Research Design

4.1 Model Construction

(1) Econometric modeling of the impact of financial innovation on economic resilience.

$$ER_{it} = \alpha_0 + \alpha_1 FI_{it} + \alpha_j Control_{it} + \delta_t + \varepsilon_{it} \quad (1)$$

In equation (1), the ER_{it} denotes the economic resilience of the i th city in period t , and FI_{it} denotes the digital economy index of the i th city in period t , and $Control_{it}$ represents a set of control

variables that affect economic resilience, and δ_t denotes the point-in-time fixed effects, and ε_{it} is the random disturbance term.

(2) Test whether the process of financial innovation's impact on economic resilience is affected by other variables. The test steps are: the coefficient in equation (1) α_1 on the basis of passing significance, introduce SOE as the moderating variable of the model, and by observing the g_1 、 g_2 the significance of the estimated coefficients such as to determine whether the moderating effect exists, the specific model is

$$ER_{it} = \beta_0 + \beta_1 FI_{it} + \beta_2 (FI_{it} * SOE_{it}) + \beta_j Control_{it} + \delta_t + \varepsilon_{it} \quad (2)$$

In equation (2), SOE represents the proportion of state-owned enterprises.

(3) Further explore the potential mechanisms by which financial innovation affects economic resilience. The coefficients in equation (1) α_1 passed with significance, the linear regression equations of financial innovation index FI on mediating variables IND and MA, and the linear regression equations of financial innovation index FI, mediating variables IND and MK on economic resilience ER are constructed respectively, by observing σ_1 , and γ_1 、 γ_2 etc. the significance of the estimated coefficients is judged whether the mediating effect exists.

$$\begin{aligned} Mediator_{it} &= \sigma_0 + \sigma_1 FI_{it} + \sigma_j Control_{it} + \delta_t + \varepsilon_{it} \\ ER_{it} &= \gamma_0 + \gamma_1 FI_{it} + \gamma_2 Mediator_{it} + \gamma_j Control_{it} + \delta_t + \varepsilon_{it} \end{aligned} \quad (3)$$

In equations (3) and (4) Mediator represent the industrial structure upgrading (IND_{it}) and market activity (MK_{it}).

4.2 Variable selection

1. Economic Resilience (ER)

Economic resilience essentially means that when an economy is subject to external shocks, the economic system is not too affected, ensuring that the economy operates normally and that economic development recovers in an orderly fashion. This paper uses an indicator system to describe the economic resilience of Chinese provinces in conjunction with existing studies. Referencing the methods of Yan Hu (2022) and Kengrui Cui (2021)^{[8][18]}, this article divides economic resilience into four dimensions, namely resistance, resilience, adaptability, and transformation, and establishes secondary indicators such as Table 1 in accordance with these divisions. Additionally, the entropy value method is used to calculate the weights of each indicator and derive an overall score.

Table 1. Economic resilience indicator system

Tier 1 Indicators	Secondary indicators	Indicator Properties
Resistance	Urban registered unemployment rate	-
	Share of tertiary sector in GDP	+
	Share of secondary industry in GDP	-
Resilience	GDP per capita	+
	Average wage of employees in employment	+
	Savings per resident	+
Adaptability	Total retail sales of social consumer goods	+
	Financial self-sufficiency rate	+
	Per capita consumption expenditure	+
Transformation Power	Number of beds per capita in health facilities	+
	Number of patents granted	+
	R&D personnel	+
	R&D input	+

2. Financial Innovation (FI)

There is no unified standard for the measurement method of financial innovation; therefore, this paper refers to Tian Yuan (2021)^[19] and modifies it to construct a financial innovation index system in China from three dimensions: financial innovation input, financial market operation, and financial outcomes. As shown in Table 2, the entropy value method is used to first standardize the data and then compute the weights to obtain the comprehensive score.

Table 2. Financial Innovation Indicator System

Tier 1 Indicators	Secondary indicators	Indicator Properties
Financial innovation input	Financial all-social fixed asset investment / all-social fixed asset investment	+
	Number of employees in the financial sector	+
	Total loans to financial institutions/GDP	+
	Bond issuance/GDP	+
Financial Market Operation	Stock exchange volume/GDP	+
	Insurance revenue/GDP	+
	Total loans from financial institutions / Total deposits from financial institutions	+
Financial Presentation	ResultsNumber of listed companies	+
	Financial sector value added/GDP	+

As shown in Figures 1 and 2, the spatial and temporal differences were mapped using ArcGIS after calculating the composite evaluation index of provincial economic resilience and financial innovation.



Figure 1. Map of spatial and temporal differences in economic resilience



Figure 2. Map of spatial and temporal differences in financial innovation

Figure 1 illustrates the upward trend in all provinces and cities' development levels of economic resilience from 2010 to 2019. Only a small number of eastern coastal regions' economic resilience indexes were above 0.2 in 2010, and by 2019, with the exception of Xinjiang, only a small number of northeastern and northwestern provinces remained below 0.2. All of the provinces in the southeast, with the exception of Jiangxi, have economic resilience indices greater than 0.3, and the coastal region has reached more than 0.4.

As seen in Figure 2, Beijing's financial innovation index was above 0.4 in 2010, and while the rest of the provinces and cities experienced steady growth, the level of financial innovation decreased in the Inner Mongolia Autonomous Region and Yunnan Province between 2015 and 2019. Among them, Tibet Autonomous Region has improved the most over the past ten years, going from below 0.1 in 2010 to above 0.3 by 2019. Both the level of financial innovation and the state of economic resilience are leading the way for national development in the eastern coastal region.

3. Moderating variables

The share of state-owned enterprises (SOE), which is expressed in this paper by using the output value of SOE as a share of GDP.

4. Mediating variables

Industrial structure upgrading (IND), this paper refers to Zhao Chunyan (2018)^[20], measured by the ratio of the added value of tertiary industry to the added value of secondary industry. The degree of market activity (MA), which is measured by the number of legal person units of private enterprises in each region selected in this paper.

5. Control variables

In order to better analyze the mechanism of the impact of provincial financial innovation on economic resilience, the article establishes five control variables, which are human capital (HC), which is the average number of students in higher education per 100,000 population; physical capital (PC), which is the ratio of total investment in fixed assets to GDP; infrastructure development (TRA), which is the ratio of investment in 'transportation, storage and postal services' to total fixed investment. The level of urbanization (UL) is the proportion of urban population to the total population; foreign trade dependence (FOR) is the ratio of total imports and exports to GDP.

4.3 Data sources and descriptions

Relevant data from 31 provinces and municipalities directly under the central government (excluding Hong Kong, Macao, and Taiwan) were collected for this study and obtained from the statistical yearbooks of each province and municipality as well as the CSMAR database and the EPS database. The very small number of missing values were filled in using linear interpolation.

The sample size for this study is 310, as shown in Table 3. Economic resilience (ER) in China currently varies significantly across 31 provinces and cities, as shown by the mean value of 0.215 and standard deviation of 0.142. The range of financial innovation is [0.046, 0.499], with a mean value of 0.147 and a standard deviation of 0.147, indicating that there is also a significant variation in financial innovation across the 31 provinces and cities, as well as variations in how well financial innovation has improved economic resilience in each region. Indicating the current uneven development between regions in China, the high sample extremes of market activity span a wide range and there are also significant differences in the upgrading of the industrial structure and the share of state-owned enterprises.

Table 3. Descriptive statistics for each variable

Variable Category	Variable Name	Symbols	Sample size	Maximum value	Minimum value	Average value	Standard deviation	Median
Explained variables	Economic Resilience	ER	310	0.825	0.036	0.215	0.142	0.171
Explanatory variables	Financial Innovation	FI	310	0.499	0.046	0.147	0.084	0.122
Intermediate variables	Industrial structure upgrading	IND	310	5.169	0.5	1.154	0.648	0.979
	Market Activity	MK	310	2567.75	1.4	312.43	383.9	185.42
Adjustment variables	Share of state-owned enterprises	SOE	310	2.461	0.001	0.121	0.281	0.034
	Human Capital	HC	310	6196	1530	2755.42	837.40	2505.88
	Infrastructure Development	TRA	310	1.188	0.002	0.084	0.139	0.037
Control variables	Urbanization level	UL	310	0.896	0.385	0.616	0.128	0.595
	Physical Capital	PC	310	1.447	0.211	0.777	0.288	0.831
	Foreign Trade Dependence	FOR	310	31.811	0.001	1.222	4.528	0.234

5. Empirical Analysis

5.1 Baseline regression analysis

Table 4 shows the benchmark results of the impact of financial innovation on economic resilience. In columns (1) and (2), the estimated coefficients of the financial innovation index are significantly positive at the 1% level regardless of the inclusion of control variables, indicating that financial innovation can enhance the level of economic resilience of China's provincial economies, a finding that verifies hypothesis 1. According to column (2), the estimated coefficients of infrastructure development and urbanization level are significantly positive at the 1% level, and the estimated coefficient of foreign trade dependence is significantly positive at the 5% level is significantly positive. This indicates that infrastructure development, urbanization level and foreign trade dependence have a positive contribution to economic resilience. The above results are generally consistent with expectations.

Table 4. Financial innovation and economic resilience: a benchmark regression

Variables	ER	ER
	(1)	(2)
FI	1.3754*** (17.59)	0.8878*** (10.36)
HC		0.0001 (0.51)
PC		0.0030 (0.17)
TRA		0.2235*** (5.39)
UL		0.9362*** (8.07)
FOR		0.0069** (2.53)
Observations	310	310
R-squared	0.5268	0.7279

Note: ***, **, and* indicate significant at the 1%, 5%, and 10% levels, and the estimated t-values are in parentheses, as below.

5.2 Analysis of Moderating Effects

The regression results in Table 5 show the moderating effect of SOE share in the relationship between financial innovation and economic resilience. FS is the interaction term between financial innovation (FI) and the share of state-owned enterprises (SOE), ER(1) is the result without the interaction term, and ER(2) is the result with the interaction term FS. The results show that the coefficient of the interaction term between financial innovation and SOE share β_2 is -0.8096, which passes the 1% significance test, implying that the moderating effect of SOEs' share is significant. The coefficient of the interaction term, however, is negative while the coefficients of the independent and moderating variables are positive, indicating that financial innovation and SOE share significantly differ in how economic resilience is impacted. Overall, the impact of financial innovation on economic resilience is diminished by the presence of SOEs. The positive impact of financial innovation tends to be diminished when the share of SOEs is higher, whereas it becomes more apparent when the share of SOEs is lower. The data presented above support hypothesis H2.

Table 5. Results of the test for moderating effects

Variables	ER	ER
	(1)	(2)
FI	0.9073*** (11.1)	1.0853*** (12.25)
HC	0.0828*** (7.78)	0.0717*** (6.76)
PC	0.0829 (0.88)	-0.0298 (-0.67)
TRA	0.0017 (0.71)	0.0002 (0.08)
UL	0.0008*** (7.22)	0.0007*** (6.41)
FOR	8.37×10^{-4} *** (6.68)	8×10^{-4} *** (6.68)
SOE	0.1153*** (4.21)	0.1262*** (4.74)
FS		-0.8096*** (-4.45)

5.3 Analysis of mediating effects

The premise of the mediation effect analysis holds in the context of the aforementioned, where financial innovation makes a significant positive contribution to economic resilience. Next, we test whether financial innovation has an indirect impact on economic resilience through changes in industrial structure and market activity. The estimated financial innovation index indices in columns (1) and (3) are significant at the 1% level. It suggests that financial innovation supports market activity and the modernization of the industrial structure. The estimated coefficients of market activity, industrial structure improvement, and financial innovation index are all significantly positive at the 1% level in columns (2) and (4), and the estimated coefficients of financial innovation index have decreased in comparison to the outcomes of the benchmark regression. It suggests that two ways financial innovation improves economic resilience are through market activity and the upgrading of industrial structure. The results presented above support hypotheses 3 and 4.

Table 6. Mechanisms of action of financial innovation affecting economic resilience

Variables	IND	ER	MK	ER
	(1)	(2)	(3)	(4)
FI	3.8016*** (10.67)	0.8708*** (10.41)	9.2360** (14.74)	0.4701*** (6.58)
IND		0.0567*** (3.95)		
MK				0.0002*** (14.21)
Control	YES	YES	YES	YES
Observations	310	310	310	310
R-squared	0.3478	0.7426	0.4826	0.8483

5.4 Robustness test

To test the robustness of the regression results, the explanatory variable ER lagged one period ER_{t-1} was included in the model for regression, and the coefficient of the core explanatory variable FI was 0.0640, which did not change in sign and still had a significant positive effect at the 1% level. Therefore, the regression results are robust.

6. Conclusions and Recommendations

This paper builds an indicator system based on the panel data of 31 provinces, cities, and autonomous regions from 2010 to 2019 and computes the comprehensive evaluation index using the entropy value method. The impact of financial innovation on the economic resilience of Chinese provinces and its mechanism of action are empirically tested using a variety of econometric models. The study demonstrates that financial innovation can significantly improve the economic resilience of China's provincial regions, and that the presence of state-owned enterprises mitigates this effect. Additionally, financial innovation enhances economic resilience through two channels that encourage market activity and upgrading of the industrial structure.

The recommendations in this paper are based on the analysis mentioned above. First, encourage the market to engage in financial innovation, optimize the allocation of investment resources, increase the investment in innovation in the financial market, design a stable financial market operation system, and enhance the mechanism for converting innovation results, so that financial innovation can effectively boost the adaptability and transformational capacity of the economy. Second, rationalize the proportion of state-owned enterprises in the market, control the size of state-owned enterprises within a reasonable range, give full play to the institutional advantages of China's public ownership as the pillar and the joint development of a multi-ownership economy, and enhance the efficiency and vitality of the market economy's operation. Third, maximizing the benefits of multiple ownership economies, raising the overall economy's level of industrial diversification, enhancing the flow of factor resources globally, and thereby enhancing our economy's resilience and adaptability. Lastly, accelerate the establishment of a large national unified market, continuously improve inter-regional exchanges and cooperation, create a coordinated and unified development pattern among various provinces and cities, and increase market activity in each province. Utilize the benefits of financial innovation on market activity and the modernization of the industrial structure to jointly support economic growth.

References

- [1] HOLLING C S. Resilience and stability of ecological systems [J]. Annual review of ecology and systematics, 1973, 4(1): 1-23.

- [2] REGGIANI A, DE GRAAFF T, NIJKAMP P. Resilience: an evolutionary approach to spatial economic systems [J]. *Networks and Spatial Economics*, 2002, 2(2): 211-219.
- [3] MARTIN R, SUNLEY P, GARDINER B, et al. How regions react to recessions: Resilience and the role of economic structure [J]. *Regional Studies*, 2016, 50(4): 561-585.
- [4] Feng Yuan, Nie Changfei, Zhang Dong. Measurement and analysis of economic resilience of Chinese urban agglomerations: A shift-share decomposition based on economic resilience [J]. *Shanghai Economic Research*, 2020, (05): 60-72.
- [5] Zhang Junwei, Jiang Xia. Research on measuring the level of economic resilience and improving countermeasures in Wuhan [J]. *Value Engineering*, 2019, 38(28): 146-150.
- [6] Xu Yuan, Zhang Linling. Economic resilience of Chinese cities and its origins: A perspective on industrial structure diversification [J]. *Finance and Trade Economics*, 2019, 40(07): 110-126.
- [7] Zeng Bing. Study on the influencing factors of China's provincial economic resilience in the context of financial crisis [J]. *Financial Theory and Teaching*, 2018, (04): 78-82+93.
- [8] Hu Yan, Chen Yuqi, Li Yan. Study on the impact of digital economy on the economic resilience of cities in the Yangtze River Delta [J]. *Journal of East China Normal University (Philosophy and Social Science Edition)*, 2022, 54(01): 143-154+175-176.
- [9] Sun Yijun. A study on measuring the efficiency of regional financial innovation and its impact on economic growth in China in the new era [D]; Qingdao University of Science and Technology, 2019.
- [10] Zhou Qiang. Study on the role of regional financial innovation in promoting economic growth in China [J]. *Journal of Guangxi University (Philosophy and Social Science Edition)*, 2021, 43(02): 85-90+98.
- [11] Wang Chan. A study on the coordination degree and spillover effects of coupling financial innovation and economic growth in China's regions [D]; Wuhan University of Technology, 2019.
- [12] Mu Niyi. Measurement and prediction of financial innovation level [J]. *Statistics and Decision Making*, 2009, (03): 140-142.
- [13] Mao K. A study on measuring the level of financial innovation in China based on principal component analysis [J]. *Time Finance*, 2009(06): 29-32.
- [14] Liu, R. M.. Financial Repression, Ownership Discrimination and Growth Drag - A Re-Examination of Efficiency Losses of State-Owned Enterprises [J]. *Economics (Quarterly)*, 2011, 10(02): 603-618.
- [15] Qi Hao, David Coates, Tian Lime, Li Zheng. The impact of state-owned enterprises on China's economic growth [J]. *Journal of Political Economy*, 2020, 17(01): 96-116.
- [16] Lang, Kun; Feng, Junxin. A study of the dynamic relationship between state-owned enterprises and economic development: empirical evidence from cross-country comparisons. *Contemporary Economic Studies* 2021, No. 5, 70-81.
- [17] Du, Yun-Zhou, Liu, Qiu-Chen, Cheng, Jian-Qing. What kind of business environment ecology produces high entrepreneurial activity in cities? --An analysis based on institutional grouping [J]. *Management World*, 2020, 36(09): 141-155.
- [18] Cui, Gongrui. Can digital finance enhance China's economic resilience [J]. *Journal of Shanxi University of Finance and Economics*, 2021, 43(12): 29-41.
- [19] Tian Yuan. Research on the Synergistic Effect of Financial Innovation and High-Quality Development of Regional Economy. Master, Shandong University of Finance and Economics, 2021.
- [20] Zhao Chunyan. The impact of population aging on regional industrial structure upgrading--a study based on a panel threshold regression model [J]. *Population Research*, 2018, 42(05): 78-89.