

A Study of the Impact of Financial Expansion on Regional Indebtedness

Jianyuan Qu

Liaoning University, Liaoning Shenyang 110136, China

574359662@qq.com

Abstract. This study examines the impact of financial expansion degree on regional liabilities, selects panel data from 30 Chinese provinces and regions from 2004 to 2020, measures the data with a two-way fixed-effects model, examines heterogeneity and moderating effects among regions, and empirically tests the relationship between the two major variables. The study found a U-shaped relationship between financial expansion and regional indebtedness for the country as a whole, developed and less developed regions, with developed regions having an inverted U-shaped relationship and less developed regions having a positive U-shaped relationship. Changes in financial expansion affect the magnitude of regional indebtedness and have a significant moderating effect on the relationship between the main variables. Regions with a higher degree of industrial expansion have more sensitive indebtedness to financial expansion changes. Based on the study's findings, this article makes significant value suggestions for regional government policies on using financial sector financing to drive economic development based on regional development.

Keywords: Financial Expansion; Regional Indebtedness; Industrial Expansion; U-shaped Relationship; Two-way Fixed Effects Model.

1. Introduction

Financial development has historically driven national and regional economic progress (Zhu and Zhang, 2019) [1], but it may also put pressure on areas to become indebted, and comprehending this topic is vital to modern economics. This study studies how financial expansion affects regional indebtedness in China in a complex and unpredictable economic environment and how industrial expansion may moderate it.

Meanwhile, financial expansion and regional economy debt are strongly correlated, according to studies. Law and Singh (2014) [2] conclude that financial expansion boosts economic growth below a specific level but increases indebtedness risk over this barrier.

However, their study did not consider regional specifics or other possible influencing factors, such as industrial expansion, which is particularly important in China, which has prioritized real economy development since reform and opening up (Jiang, 2019) [3]. Based on Feder's (1983) [4] study of the export sector's impact on economic growth, the "two-part division method" has been used to distinguish between the real sector and the real sector in some financial expansion studies. Wu and Wang (2018) [5] extended the method to measure the relationship between financial expansion and economic growth, using the total growth of the industrial sector as the counterpart of financial expansion, highlighting the importance of industrial growth to the latter. Rey and Xie (2017) [6] suggested that industrial expansion may affect economic indebtedness, but their study was theoretical. This study measures this variable using the ratio of industrial value added to GNP as a moderating interaction factor to address the research gap left by their theoretical analysis.

In conclusion, this paper investigates the relationship between financial expansion and regional indebtedness and innovatively uses industrial expansion as a moderating variable to make policy recommendations for Chinese provinces and regions with different industrial development levels. In addition to interpreting the benchmark regression results, the study uses tertiary industry, urbanization, general budget expenditures, transport accessibility, R&D expenditures, and fixed investment as control variables. Heterogeneity is analyzed by splitting the data into developed and underdeveloped regions, and robustness tests are done using replacement and time horizon restriction. Finally, to address endogeneity, the lagged financial growth degree was used for analysis. This study shows the

intrinsic relationship between financial expansion and regional indebtedness degree, as well as the moderating role of industrial expansion, which is important for understanding and managing financial expansion's debt risk and industrial expansion's strategic role in economic adjustment.

2. Literature Review

This study's literature review has shown how researchers have moved from studying the linear relationship between financial expansion and economic development to studying the non-linear relationship between financial expansion and intermediate variables affecting economic quality after the 2008 financial crisis, highlighting the importance of studying regional investment.

First, Chinese and western scholars' discussion of financial expansion and economic development began with Schumpeter's (1912) [7] financial promotion theory, while Wu and Wang (2018) [5] start with it and divide subsequent theories with the 2008 financial crisis. Before the crisis, the academic community generally believed that In other words, before the financial crisis, financial expansion was widely recognized as beneficial to the economy, but after the crisis, its positive effects were limited and research on the optimal critical value of financial expansion emerged. Non-linear research is replacing linear research for crucial value exploration, and more researchers are adding the quadratic term of the explanatory variables to the model (Li and Li 2017) [8]. Many scholars began to construct more detailed theoretical analyses to better give the quadratic term a realistic meaning, cope with Cline (2015)'s [9] measure about the lack of causality of the variables yet still derive the relevant critical value, and explore whether the nonlinear relationship between the two is statistical artefacts. For example, Zhang J. et al. (2021) [10] examined the relationship between financial expansion and However, Liu et al. (2023) [11] conducted theoretical analyses of the relationship between financial expansion and the competitiveness of scientific and technological talents, and Cecchetti and Kharroubi (2015) [12] developed a growth model of the concentration of high-skilled employees in firms with a well-developed internal financial sector and discussed the negative effects of financial sector talent appropriation on development. Future studies must examine the mediation effects of financial expansion and economic development and identify elements that financial expansion first influences that subsequently affect economic quality.

In terms of the empirical result, Riojia and Valev (2004) [13] found a non-linear relationship between economic development and financial growth, while Rousseau and Wachtel (2011) [14] and Shen and Lee (2006) [15] explicitly found an inverted U-shape relationship. The two have a more quantified relationship. Today's research focuses on specific theoretical arguments, such as the need to explore the impact of intermediation effects on economic growth based on specific contexts and selected data, and the interplay between indebtedness and financial expansion is particularly evident in the Chinese economy, where indebtedness is much higher than in comparable economies like Brazil and Russia and has a signi macroeconomic stability (Zou 2014) [16], Wang et al. (2018) [17] show that high indebtedness may delay economic growth and increase financial hazards. Current Chinese economic research focuses on how to balance financial expansion and indebtedness risk as an intermediate variable of financial expansion affecting economic development.

While much Chinese literature has measured the relationship between financial expansion and economic growth, few studies have examined the relationship between financial expansion and regional indebtedness in differentiated provincial areas or introduced industrial expansion as a moderating variable. This study combines financial expansion, regional indebtedness, and industrial expansion to fill the research gap by examining their intrinsic relationship and interaction mechanism. The absence of industrial growth may overlook its compensatory effect on regional indebtedness (Zheng, 2015) [18].

3. Theoretical Mechanisms and Formulation of Hypotheses

3.1 U-shaped Relationship between Financial Expansion and Regional Indebtedness

According to Fang and Shao (2022) [19], financial expansion can reduce regional indebtedness, boost the real economy, and boost some businesses' profitability. Moderate financial expansion can help reduce company indebtedness since companies can use financing capital to reinvest or make up for cash flow constraints, and local governments can do the same (Sun, 2013) [20]. However, financial expansion above a particular level may exacerbate regional indebtedness. According to Liang and Fei (2022) [21], different levels of regional economic development may have opposite effects on the threshold's significance, and Shen and Lee (2006) [15] noted that financial growth and economic development have an inverted U-shaped relationship, but the shape may vary by region. Based on this, this paper's initial hypothesis is:

Hypothesis 1: Financial expansion and regional liabilities have a U-shaped relationship in all Chinese regions, however it may vary based on economic development.

3.2 Strengthening of the Relationship between Financial Expansion and Regional Indebtedness by the Degree of Industrial Expansion

China's industrial economy is crucial to its growth (Jiang 2019) [3], and as the government's focus on environmental auditing grows, the industrial sector needs more technological inputs to stay profitable (Albertini 2013) [22], so industrial firms must innovate to ensure the industry is environmentally friendly. Thus, an expanding industrial economy can completely reflect a region's innovation capacity. Huang (2015) [23] shows that industrial expansion can boost economic growth, employment, and revenue, reducing regional indebtedness. Financial capital utilisation can also be improved by a more developed industrial economy because financial expansion demands stronger infrastructure and productivity (Lu and Mu, 2003) [24]. This leads to the paper's second hypothesis:

Hypothesis 2: Industrial expansion will strengthen the association between financial expansion and regional indebtedness.

Figure 1 shows the financial expansion and regional indebtedness mechanism based on the aforementioned theoretical analysis and hypothesis.

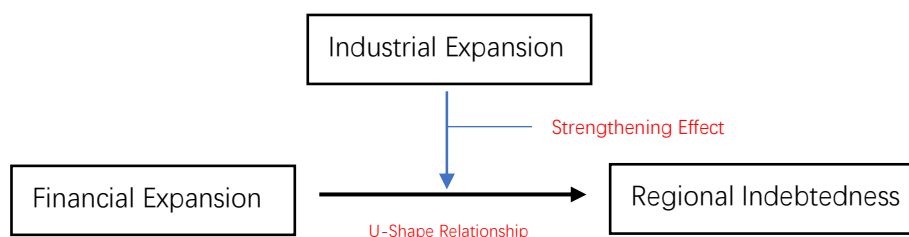


Figure 1 Mechanisms of Moderating Effects

4. Study Design and Data description

4.1 Model Selection

This study adopts a two-way fixed-effects model to explore the relationship between financial expansion, industrial expansion and regional indebtedness through multiple linear regression modelling using annual data from China's provincial-level administrative units (2004-2020) as a sample.

The explanatory variable is regional indebtedness, which measures the ratio of regional debt size to regional GDP. The main independent variable is financial expansion, which is measured using the ratio of regional financial sector value added to regional GDP. The measurement of other moderating and control variables will be explained in the next part.

For the model setup, we used a fixed effects model to eliminate unobserved heterogeneity between regions, such as the impact of new economic policies proposed by the state on the overall data due to changes in time.

With the above design, this study aims to provide an in-depth understanding of the intrinsic relationship between financial expansion, industrial expansion and regional indebtedness for policy makers.

4.2 4.2 Sample and Data Sources

The sample selection for this study covers 30 provinces and municipalities in China (Tibet is excluded). In order to ensure the reliability and representativeness of the study, provinces and municipalities that are broadly representative of the level of economic development and the degree of development of financial markets in different regions were selected as the sample subjects.

The data source for the sample relies heavily on the EPSDATA database, and the time period chosen for the study is from 2004 to 2020, a choice that helps to capture the long-run relationship and trend changes between financial expansion and regional indebtedness. By analysing the data over this time period, the impact of financial expansion on regional indebtedness can be better understood, and the changing trends over different time periods can be observed and interpreted.

4.3 Benchmark Regression Models, Moderator Variable Models, and Variable Meanings

In order to test the relationship between the degree of financial expansion and regional indebtedness, this study constructs a two-way fixed-effects model as the benchmark regression model, while the benchmark regression model defaults to the first-stage model due to the use of lagged one period of the explanatory variables in the instrumental variables section:

To better study the impact of the degree of financial expansion on regional indebtedness, this model is constructed as follows:

$$Lia = \alpha Exp_{it}^2 + \beta Exp_{it} + \gamma X_{it} + \sigma_t + \mu_t + \varepsilon_{it}$$

For dealing with individual area effects and time effects, a two-way fixed effects model is used. Since China's economic policies change frequently, there are different policy time effects in different years. Using a two-way fixed effects model allows time effects to be taken into account by generating dummy variables. In the model, the **Lia** indicates the level of regional indebtedness, **Exp_{it}** representing the degree of financial expansion, **Exp_{it}²** is the secondary term for financial expansion, **X_{it}** indicates the control variables, **σ_t** represents time effects that do not vary with individual heterogeneity, **μ_t** represents area effects that do not vary over time, **ε_{it}** is the random error term, the **i** indicates different provinces, and **t** indicates different time intervals.

And the explanatory variable is the degree of regional indebtedness (**Lia**) derived from the ratio of total regional liabilities to total regional assets. The explanatory variable is the degree of financial expansion (**Exp**), calculated from the ratio of regional financial value added to regional GDP value added. Control variables include the ratio of value added of tertiary industry to value added of secondary industry (**IP**)、urbanisation rate (**PP**)、Ratio of general budget expenditure to GDP (**OS**)、ratio of the sum of road mileage and railway mileage to the area of the province (**TI**)、ratio of internal expenditure on R&D to GDP (**RG**) and the ratio of fixed investment to GDP (**FG**). Through the selection and processing of samples and data, we constructed a comprehensive and representative research model in order to explore in depth the impact of financial expansion on regional indebtedness and its related factors.

In addition, the moderating variable in this paper is the degree of industrial expansion (**Ing**). The degree of industrial expansion refers to the ratio of the current year's industrial value added to the current year's GDP of each province, which can reflect the province's infrastructure, productivity, and capacity for industrial transformation under the new economic normal. In order to test the moderating

effect of industrial value added, this paper builds the following moderating effect model, drawing on the test method of Wen and Ye (2014) [25].

$$Lia = \alpha Exp_{it}^2 + \beta Exp_{it} + \beta_2 Lng_{it} + \beta_3 Exp_{it} \times Lng_{it} + \gamma X_{it} + \sigma_t + \mu_t + \varepsilon_{it}$$

By introducing the degree of industrial expansion into the model as an interaction term, the external influence on the degree of financial expansion and regional indebtedness can be better explored, which is also the innovation of this paper. In order to better understand the variables of the model, the meaning of each variable is shown in Table 1.

Table 1 Meaning of Variables

Variable Type	Variable Code	Meaning	Calculation Method
Explanatory Variable	Lia	Regional Indebtedness	Provincial Liabilities/Total Provincial Assets
Core Explanatory Variables	Exp	Regional Financial Expansion	Provincial Financial Growth/Provincial GDP
Other Explanatory Variables	Ing	Regional Industrial Expansion	Provincial Industrial Growth /Provincial GDP
Moderator Variable	Exping		Exp*Ing
Instrumental Variable	ExpL1	Regional Financial Expansion Lags Behind by One Period	
Control Variable	IP	Proportion of Industry	Provincial Tertiary Industry Growth / Provincial Secondary Industry Growth
	PP	Urbanisation Rate	Population of Cities in Provinces/Total Population of Provinces
	OS	General Budget Expenditure percentage	Provincial General Budget Expenditure/Provincial GDP
	TI	Traffic Convenience	(Road Mileage + Railway Mileage)/Provincial Province Area
	RG	R&D Expenditure Emphasis	Internal Expenditure on R&D in Provinces / Provincial GDP
	FG	Fixed Investment Emphasis	Provincial Fixed Investment/Provincial GDP

5. Empirical Analysis

5.1 Descriptive Statistical Analysis

The relevant variables' descriptive statistics are in Table 2. The mean value of Lia is 0.585, and the maximum value is 0.819, indicating that each province has excessive debt, which could hurt economic development. The regions also pay little heed to financial expansion and are within the safe range, since Exp ranges from 0.006 to 0.199. OS has the highest standard deviation because developed and underdeveloped regions use funds differently and have different financial strengths. Eastern

developed provinces can use more general budget expenditures, while underdeveloped regions cannot make large government investments. All variables fall within the normal range, proving data accuracy.

Table 2 Descriptive Statistics

Variable Type	Mean	Standard Deviation	Minimum	Maximum
Lia	0.585	0.056	0.367	0.819
Exp	0.056	0.032	0.006	0.199
Exp2	0.004	0.006	0.001	0.040
IP	1.076	0.616	0.494	5.310
PP	0.545	0.142	0.263	0.896
OS	0.221	0.985	0.792	0.643
TI	0.857	0.505	0.040	2.234
RG	0.760	0.455	0.604	0.869
FG	0.690	0.251	0.209	1.479

5.2 Benchmark Regression Analysis

Using a two-way fixed effects model, after fixing the time and area effects, the selected samples were regressed and the following data were obtained. Based on these data, it can be concluded that there is an inverted U-shaped relationship between the degree of regional indebtedness and the degree of financial expansion (Exp the primary term is positive and the secondary term is negative), and hypothesis 1 is partially verified. In addition, from the regression results, it can be seen that the effect of the degree of financial expansion on regional indebtedness has a significant effect and is significant at the 1 per cent statistical level.

Table 3 Benchmark Regression Results

Variable Type	Y: Lia	Estimated Results
Core Explanatory Variables	Exp	0.759** (0.256)
	Exp2	-3.487*** (1.252)
		0.003 (0.007)
Control Variable	IP	-0.125** (0.055)
	PP	0.261*** (0.047)
	OS	-0.034*** (0.010)
	TI	-0.296** (0.145)
	RG	-0.017 (0.011)
	FG	Control
		Control
Time Effect	Control	Control
Regional Effect	Control	Control
R2		0.1832
Obs		510
	_Cons	0.829*** (0.092)

5.3 Heterogeneity Analysis

This study separates national data into east, center, and west and adjusts the traditional regional division to the economic position of provinces and municipalities directly under the central government. The eastern region is developed, the central and western regions are underdeveloped, and the western region has a lower level of development than the central region, which is used to classify a portion of the traditionally eastern region as part of the central underdeveloped region.

Regression tests with a two-way fixed-effects model showed an inverted-U-shaped association between financial expansion and regional indebtedness in the east. Regional indebtedness is higher when financial expansion is low or high and lower when moderate. This suggests that financial expansion affects regional indebtedness non-linearly.

After controlling for other variables, urbanization rate, general budget expenditure, and fixed investment also affect regional indebtedness. This suggests that urbanization, government spending, and fixed capital investment may raise regional indebtedness in the east. The favorable U-shaped association between financial expansion and regional indebtedness is stronger in the center. That is, regional indebtedness is higher when financial expansion is low or high and lower when moderate. We also find that urbanization and budget expenditure significantly affect regional indebtedness. This shows that central region urbanization and fiscal policy contribute to regional indebtedness. In the west, financial expansion does not affect regional indebtedness. This suggests that western financial expansion does not affect regional indebtedness. Urbanization rate, internal R&D spending, and fixed investment significantly affect regional indebtedness. This may be owing to western economies' more backward investment structures.

Table 4 Heterogeneity Regression

Regions	East	Central	west
Exp	1.197*** (0.406)	-2.62*** (0.850)	0.716 (0.752)
Exp2	-6.247*** (1.710)	31.257*** (6.951)	-1.584 (5.747)
IP	0.005 (0.010)	0.021 (0.014)	0.024* (0.015)
PP	-0.142* (0.082)	-0.227* (0.125)	-0.440*** (0.105)
OS	0.326*** (0.125)	0.211* (0.111)	0.149*** (0.057)
TI	0.027* (0.015)	-0.035* (0.019)	-0.033** (0.017)
RG	-0.880*** (0.274)	0.153 (0.399)	0.557** (0.219)
FG	-0.044** (0.019)	-0.053** (0.023)	0.053*** (0.053)
Time Effect	Control	Control	Control
Regional Effect	Control	Control	Control
_Cons	1.233*** (0.178)	0.628** (0.252)	0.287** (0.131)
R2	0.2517	0.5042	0.3035
Obs	187	136	187

5.4 Robustness Test

We performed two stability tests to assess model resilience. To rerun the regression analysis, we omitted Beijing, Tianjin, Shanghai, and Chongqing data. Second, only 2012 data was used for regression analysis. Based on Wang and Ma (2023) [26], we excluded the data of Beijing, Shanghai, Tianjin, and Chongqing, which are directly under the central government, and reran the regression test. Second, it reruns the regression using just data after 2012. The robustness test showed that the significant levels of the core explanatory variables in this study have not altered, hence the previous conclusion remains. In conclusion, the stability test shows that the model's fundamental conclusions remain constant whether we ignore municipal data or utilize only data after 2012, confirming our study's dependability.

Table 5 Robustness Test

Variable Type	Y: Lia	Sample of 4 Municipalities Excluded	Post-new Normal Data after 2012
Core Explanatory Variables	Exp	-1.271** (0.500)	1.016*** (0.347)
	Exp2	14.256*** (3.802)	-6.613*** (1.651)
Control Variable	IP	0.036*** (0.011)	0.004 (0.009)
	PP	-0.070 (0.103)	-0.093* (0.090)
	OS	0.153*** (0.056)	0.227*** (0.070)
	TI	-0.064*** (0.014)	-0.011 (0.023)
	RG	-0.168 (0.159)	-0.717** (0.285)
	FG	-0.003 (0.012)	0.009 (0.010)
	_Cons	0.756 (0.115)	0.753*** (0.185)

5.5 Endogenous Problems

Endogeneity was addressed through instrumental factors in the empirical analysis. The instrumental variable strategy used the explanatory variable's lagged one period. The dependent variable was the lagged one period of the explanatory variable Exp (ExpL1) in a first-stage regression. The correlation coefficient of ExpL1 was 1.009***, with a standard deviation of 0.010. This shows that the instrumental variable can better predict and represent Exp's movement. ExpL1 was the main explanatory variable in the second stage regression, with Exp, Exp², Exping, Exp2ing, and other control factors as independent variables. Explanatory variable Exp has a correlation of 0.773*** and a standard deviation of 0.179. After controlling for instrumental variables, Exp influences regional indebtedness.

The instrumental variable technique eliminates endogeneity in estimation findings and accurately determines the causal relationship between explanatory variables and regional indebtedness. This boosts findings' believability and empirical results. The first-stage instrumental variable regression in the Cragg-Donald Wald F-test uses the lagged one period of the explanatory variable Exp (ExpL1) as an instrumental variable and ExpL1 as the dependent variable. The Cragg-Donald Wald F statistic of 5357.85, far above the essential value, demonstrated the instrumental factors' validity and eliminated weak instrumental variables. This supports this study's instrumental variable technique and causal link between explanatory variables and regional indebtedness.

Table 6 Instrumental Variable Technique

Variable Type	Phase I	Phase II
	Y: Exp	Y: ExpL1
	ExpL1	Exp
	Estimated Results	Estimated Results
	1.009*** (0.010)	0.773*** (0.179)
Cragg	5357.85	

5.6 Moderating Effects

In order to investigate the moderating effect of financial expansion on the degree of regional indebtedness, we introduced the interaction terms Exping and Exp2ing and conducted a moderating effect analysis. Without considering the moderating effect, the correlation coefficient of the

explanatory variable Exp is 0.759^{***}, with a standard deviation of 0.256, while the correlation coefficient of the explanatory variable Exp2 is -3.487^{***}, with a standard deviation of 1.252. When the moderating effect is introduced, we can see that the correlation coefficient of Exp increases to 2.233^{***}, with a standard deviation of 0.469, and that Exp2's correlation coefficient becomes -10.050^{***} with a standard deviation of 1.839.

These results imply that the effect of the degree of financial expansion (Exp) on the degree of regional indebtedness (Lia) becomes more significant after accounting for the moderating effect. Specifically, the positive effect of the degree of financial expansion is enhanced, while the negative effect of the squared term of the degree of financial expansion (Exp2) is also enhanced. This suggests that the effect of the degree of financial expansion on the degree of regional indebtedness becomes more pronounced in the presence of the moderating variables and exhibits a stronger non-linear relationship. Thus, the results after the introduction of the moderating effect further support the complex relationship between financial expansion and regional indebtedness and suggest that industrial expansion plays an important moderating role in regulating the relationship between financial expansion and regional indebtedness. The results of the moderating mechanism enable the government to better choose the timing of financial expansion, as the U-shaped relationship between the explanatory variables and the explained variables is greatly strengthened in the provinces with greater industrial expansion and more developed economies, which means that each unit increase in the local financial expansion before reaching the critical value will bring more financial pressure to the government. However, after the critical value is reached, more financial expansion can reduce the pressure of indebtedness and improve the economic situation more quickly.

Table 7 Moderating Effects

Explanatory Variable	Moderating Effect not Introduced	Moderating effect introduced
Exp	0.759 ^{***} (0.256)	2.233 ^{***} (0.469)
Exp2	-3.487 ^{***} (1.252)	-10.050 ^{***} (1.839)
Exping		-5.610 ^{***} (1.031)
Exp2ing		2.874 ^{***} (7.728)
Ip	0.003 (0.007)	0.003 (0.012)
Pp	-0.125 ^{**} (0.055)	0.143 (0.091)
Os	0.261 ^{***} (0.047)	0.183 ^{***} (0.053)
Ti	-0.034 ^{***} (0.010)	-0.052 ^{***} (0.012)
Rg	-0.296 ^{**} (0.145)	-0.381 ^{**} (0.156)
Fg	-0.017 (0.011)	-0.028 ^{**} (0.012)
Time Effect	Control	Control
Regional Effect	Control	Control
_Cons	0.829 ^{***} (0.092)	0.815 (0.116)

6. Conclusions and Recommendations

6.1 Conclusion

Through this empirical study, we find a U-shaped relationship between the degree of financial expansion and regional indebtedness, i.e., an increase in the degree of financial expansion contributes

to an increase in regional indebtedness to a certain extent, but as the degree of financial expansion increases further, regional indebtedness decreases instead. This finding reveals the complex mechanism by which financial expansion affects regional indebtedness.

Second, we find differences in the responses of different regions to the relationship between financial expansion and regional indebtedness. In the eastern region, the inverted U-shaped relationship between financial expansion and regional indebtedness is the most significant, while the urbanisation rate, general budget expenditure and fixed investment also have a significant impact on regional indebtedness. In the central region, the positive U-shaped relationship between the degree of financial expansion and the degree of regional indebtedness is more significant, and the urbanisation rate and general budget expenditure have a significant impact on the degree of regional indebtedness. In the western region, the financial expansion degree has a non-significant effect on regional indebtedness, but the urbanisation rate and internal expenditure on R&D have a significant effect on regional indebtedness.

In addition, we further analysed the moderating effect and found that the relationship between the degree of financial expansion and the degree of regional indebtedness changed after the introduction of the moderating variables, and the correlation was more significant. In particular, the degree of industrial expansion has a significant moderating effect on this relationship, further strengthening the correlation between financial expansion and regional indebtedness.

In summary, this study provides a comprehensive empirical analysis of the impact of financial expansion on regional indebtedness and reveals the variability and moderating effects across regions. These findings are of great significance for understanding the impact of financial expansion on local economy and finance, and provide theoretical and empirical support for relevant decision-making. Meanwhile, this study also provides reference and inspiration for further research exploring the relationship between financial expansion and regional economy.

6.2 Recommendation for Policy

Two suggestions are made to promote the reduction of regional indebtedness and the growth of economic stability:

1. Local governments in developed regions need long-term financial expansion plans. In established regions, financial expansion initially does not reduce regional indebtedness, but after a threshold is achieved, expenditures can be recovered and sustained economic development can be supported, reducing indebtedness. Thus, industrialized nations must invest more in financial expansion to boost economic growth. In contrast, financial expansion and other financing activities like debt mitigation only have a positive effect in the early stages. Too much financial financing can cause regional liabilities to rise, so less developed regions should keep their financial expansion policy low.

2. For provinces and regions with better industrial development, financial expansion strategies should be more conservative. Better industrial growth and productivity can reduce regional debt in developed regions, but the U-shaped relationship has intensified, so regional debt will climb faster in the early stages. In less developed locations, high-quality industrial levels can expedite early indebtedness fall but also late indebtedness increase.

References

- [1] Zhu C, Zhang B. An empirical investigation of the relationship between financial development and economic growth in China[J]. *Financial Economy*, 2019(4): 130-131.
- [2] Law, S. H and Singh N. Does Too Much Finance Harm Economic Growth? [J]. *Journal of Banking & Finance*, 2014(20): 36-44.
- [3] Jiang X. New China's 70 years of opening up to the outside world: empowering growth and reform[J]. *Management World*, 2019(12): 7-22.
- [4] Feder G. On Exports and Economic Growth [J]. *Journal of Development Economics*, 1989, 12(1): 59-73.

- [5] Wu M, Wang C. Has Financial Expansion Hurt the Real Economy-Theoretical and Empirical Analyses Based on the Two-Sector Division Approach[J]. *Research in Financial Economics*, 2018, 33(2): 5-15.
- [6] Rey, S., & Xie, D. Industrial Expansion: The Silent Middleman of Economic Growth[J]. *Economic Theory*, 2017(65): 61-589.
- [7] Schumpeter J.A. 1912. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Oxford: Transaction Publishers.
- [8] Li Q, Li S. The impact of fiscal expenditure and financial development on economic growth: nonlinear effects and correlation mechanism[J]. *Finance and Trade Economics*, 2017(2): 21-29.
- [9] Cline, W.R. Too much Finance, or Statistical Illusion? [J]. *Policy Brief*, Peterson Institution for International Economics, 2015(9): 9-15.
- [10] Zhang J, Wu S, Jin Y. The innovation effect of local firms under financial expansion in China-an explanation based on an inverted U-shaped relationship[J]. *Financial Research*, 2021(4): 55-72.
- [11] Liu Y, Peng Y, Li Y, Duan D. The impact of financial expansion on the competitiveness of scientific and technological talents[J]. *Co-operative Economy and Technology*, 2023(12): 88-91.
- [12] Cecchetti S.G, Kharroubi E. 2015. Why Does Financial Sector Growth Crowd Out Real Economic Growth?[M]. BIS Working papers No 490.
- [13] Rioja F, Valev N. Finance and the Sources of Growth at Various Stages of Economic Development[J]. *Economic Inquiry*, 2004 (42): 127-140
- [14] Rousseau P, Wachter P. What is Happening to the Impact of Financial Deepening on Economic Growth?[J]. *Economic Inquiry*, 2011(49): 276-288.
- [15] Shen C.H, Lee C.C. Same Financial Development yet Different Economic Growth-Why?[J], *Journal of Money, Credit and Banking*, 2006(38): 1907-1944.
- [16] Zou, C. Macro coping strategies in China's highly indebted economy pattern[J]. *Financial Economy*, 2014(10): 29-31.
- [17] Wang Y, Li S, Liu J. Regional indebtedness, financial development and economic growth[J]. *Economic Research*, 2018(9): 51-66.
- [18] Zheng, Y. N. The impact of industrial expansion on economic growth - the case of China[J]. *World Economy*, 2015(4): 33-48.
- [19] Fang Y, Shao Z. China's financial cycle and horizontal correlation: A combined temporal and spatial two-dimensional perspective[J]. *Financial Research*, 2022(1): 42-60.
- [20] Sun X. Research on the relationship between monetary policy and financial crisis: a theoretical overview[J]. *Financial Development Research*, 2013(11): 5.
- [21] Liang S, Fei Y. The development status, main reasons and policy suggestions of the problem of high indebtedness of private enterprises in China[J]. *Macroeconomics*, 2022(7): 25-32.
- [22] Albertini. Does the market respond to an endorsement of social responsibility? The role of institutions, information, and legitimacy. [J] *E. J. O. and Environment* 2013, 6(6): 1461-1485.
- [23] Huang J, Xu Z, Xu S. Land Price Distortion, Firm Attributes and Overinvestment - An Empirical Study Based on Chinese Industrial Firm Data and Urban Land Price Data[J]. *China Industrial Economy*, 2015(11): 5-22.
- [24] Lu F, Mu L. Indigenous Innovation, Capability Development and Competitive Advantage - The Development of China's Laser Video Disc Player Industry and its Policy Implications for the Role of Government[J], *Management World*, 2003(12): 57-82.
- [25] Wen Z, Ye B. Mediation effects analysis: methodology and model development[J]. *Advances in Psychological Science*, 2014, 22(5): 731-745.
- [26] Wang Y, Ma C. The Fiscal Expenditure on Agriculture, Science Innovation and Economic Growth[J], *Xinjiang State Farms Economy*, 2023(8): 23-31.