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Economic Growth in Rural Areas, Resource Agglomeration, and Stock Market Performance: Evidence from China

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Abstract: This study aims to explore the potential association between the performance of the stock market and the growth of the rural economy in China. It examines the impact of regional market volatility on rural macroeconomic indicators, which functions through the equity price fluctuations of locally listed firms. The analysis utilizes financial performance data from publicly traded companies across 283 prefecture-level cities within 31 provinces in China, spanning from 1996 to 2021. This research documents a resource agglomeration effect, which is induced by the inflow of various resources by listed companies into their respective regional areas, and which emerges as the key driver for the development of the rural economy in those regions. Additionally, this study uncovers the advantages of the risk diversification effect that arises from the aggregation of resources. These findings have three significant implications. First, both effects are identified as concurrent mechanisms without any evidence of a crowding-out effect. Secondly, multiple avenues are presented through which financial capital can affect the rural economic development of a region. Lastly, this study suggests specific strategies for assessing the equity market's role in ensuring the sustainable development of the Chinese rural economy.

Keywords: capital market fluctuations; rural economic development; resource agglomeration effect; portfolio risk diversification



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1. Introduction

In June 2023, the People's Bank of China, the Financial Supervisory Authority, the China Securities Regulatory Commission, the Ministry of Finance, and the Ministry of Agriculture and Rural Development jointly issued the "Guidance Opinions on Financial Support to Comprehensively Promote the Revitalization of Rural Areas and Accelerate the Construction of a Strong Agricultural Country". The guidance sets out the importance of strengthening the capacity of financial services to help comprehensively promote rural revitalization and accelerate the construction of a strong agricultural economy. In this context, it becomes particularly important to review whether there has existed a potential strong correlation between financial market risk management and rural economic development in the past two decades. Therefore, this study has meaningful theoretical and practical significance in exploring this direction and identifying the functionary mechanism that underlies the concerned relationship. In particular, the present paper aims at the following three tasks. To begin with, regarding the research perspective, this paper digs deeper into the elements of market volatility of listed companies, especially the higher-order volatility components, and puts forward the completeness of the risk–return performance evaluation of listed companies. This perspective enriches the existing literature on the impact of capital market volatility on macroeconomics, especially the relatively indirect and remote

influences on the rural economy. Turning to research content, this paper unravels the “black box” of risk transmission paths and highlights the means and methods of risk prevention and diversification. Through the analysis and discussion of capital market risk, this study provides a valuable reference for guiding the development of the stock market and rural economic growth. Finally, this paper employs principal component analysis as the main research methodology to construct an overall volatility index that includes both traditional second-moment risk measures and higher-order volatility measures. We can hence further explore the impact of capital market volatility changes on regional and rural economic development in higher dimensions of the market risk space. The use of this method not only provides researchers with new ideas and tools but also provides theoretical support for local governments to formulate rural development policies and manage financial risks.

Using data from 283 prefecture-level cities under 31 provincial-level administrative regions in China from 1996 to 2021, this paper first analyzes the impact of market risk on rural economic development and then points out the three influential paths through which financial capital plays a role in the development of the rural economy in the region. Based on the findings, we suggest improvement steps by which the capital market can provide a boost to the rural economy in China. We document three regularities. Firstly, all other things being equal, the increase in market volatility in the region will promote the development of the rural economy in the region in the current year. Secondly, the “resource agglomeration effect”¹ caused by the operation of listed companies in the region can increase the rural GDP in the region, and this effect can play some role in “risk diversification”² which positively affects the risk mitigation of local investment portfolios. Thirdly, these two effects can exert a good impact at the same time and do not produce a crowding-out effect.³ Given the above findings, this study is an essential piece for understanding the complex relationship between the risk control of equity financial markets and rural economic development in emerging economies. On the one hand, it enriches the existing literature on the impact of capital market volatility and macroeconomics; on the other hand, it also reveals possible channels to prevent and diversify financial risks. Meanwhile, by using principal component analysis to construct comprehensive indicators, we further explore the impact of capital market volatility on the regional economy without disturbances from a variety of risk measures. In future research, we can further investigate the relationship between macroeconomic factors and stock market volatility and enhance our research on other factors that may affect stock market risk. This will help us better understand the operating mechanism of the financial market and provide investors with more accurate and comprehensive risk assessment tools. These findings will provide useful references and guidance to financial institutions, government regulators, and agencies that implement rural economic development goals in China.

The marginal contributions of this paper are at least twofold. [Bian et al. \(2024\)](#) revealed a significant negative association between Chinese stock market development and the imbalance of regional economic development, whereas our results supplement their study by suggesting that the issuers in the stock market can promote the coordinated development of the regional and rural economy. Our paper is also consistent with [S. Xu et al. \(2024\)](#), where the authors utilized a 14-indicator index to measure China’s rural marketization economic development and emphasized the synchronized development pace between rural and urban areas through promoting land property rights and capital market reallocation. In summary, we validate that the promotional role of the stock market in the coordinated development of the regional economy requires appropriate assistance from local governments from a novel viewpoint of geographical factors and diversification functions combining various production inputs through the vehicle of publicly listed firms in the equity market. Based on these linkages with the recent advances in the relevant

literature, we recommend that China should accelerate and improve the construction of multi-level stock markets to leverage the positive role of these markets in achieving less risky regional economic development.

The remainder of this paper is structured as follows. Section 2 reviews the literature and explores how changes in firms' stock price volatility affect the rural economic development of the region in which firms are located, hence proposing the hypotheses required in the subsequent empirical tests. Section 3 describes the data sources, the construction of variables, and the regression methodology. Section 4 presents the estimation results and conducts a detailed analysis, followed by Section 5 which concludes with policy implications.

2. Literature Review and Hypothesis Development

The equity market constitutes a key part of capital allocation and circulation and can thus become a major source of market volatility. A healthy and stable financial market facilitates economic development. However, according to the theory of behavioral finance, investors tend to be attracted by greater volatility in the prices of financial assets and thus start focusing on speculation. In addition, more volatile financial assets may also provide excess returns when the average rate of return remains constant. Therefore, it has become imperative to study stock market volatility, resource agglomeration induced by listed firms, and the extent to which macroeconomic conditions are connected to them. Since Schwert (1989) raised this issue, academics have continued to explore this topic using various methods and different datasets. In recent years, many studies have shown that macroeconomic factors exert a significant impact on the stock market. First, economic growth potential is one of the important driving forces for the stock market to perform well. When the economy grows rapidly, corporate profits usually increase, which will attract more investors to participate in the stock market. In this case, stock prices tend to rise and are accompanied by fewer fluctuations. However, macroeconomic volatility can also adversely affect the stock market. For example, during a recession, corporate profits fall and investor confidence wanes, leading to sharp declines and high volatility in the stock market. In addition, factors such as the rate of inflation, the level of interest rates, and government fiscal policies may change the outlook on stocks as well. Apart from macroeconomic factors, several other factors are also closely related to stock market volatility. For example, resource agglomeration is an emerging issue, and studies have found that the uneven distribution of resources among specific industries or companies may lead to stock price volatility. In addition, investor sentiment and behavior in times of financial crisis or market panic could cause dramatic fluctuations in the stock market. Overall, not all macroeconomic factors can fully explain the variation in stock market returns and risks. However, when exploring the impact of macroeconomic factors on the stock market, researchers need to consider multiple variables and apply appropriate statistical methods.

2.1. Macrodeterminants of Stock Market Volatility

As for mature stock markets in the developed world, there exists a more significant and stable relationship between macroeconomic parameters and stock market growth. In the extant research body, scholars have made many important remarks about this relationship. McQueen and Roley (1993) state in their study that the volatility of macroeconomic parameters has a strong explanatory power for the stock market risk premium. This means that when macroeconomic parameters change, the returns demanded by investors in the stock market adjust accordingly. For example, when the macroeconomy is in a high-growth phase, investors are usually more willing to take risks and expect higher returns. On the contrary, during periods of low growth or recession, investors are more cautious and set

more conservative expectations for returns. [Rapach et al. \(2005\)](#) further point out that macroeconomic parameters are good predictors of stock market returns. By analyzing historical data and trends, they identify several patterns and regularities associated with specific macroeconomic indicators. These indicators can help investors predict future stock market performance and outperform the market. Specifically, macroeconomic indicators such as the growth rate of gross domestic product (GDP), the unemployment rate, and the inflation rate are closely related to stock market movements. [Beltratti and Morana \(2006\)](#) examine the synergies between stock market cyclical shifts and business cycles in the U.S. They document a degree of synchronization between stock market volatility and macroeconomic fluctuations. When the macroeconomy is in an expansionary state, the stock market usually trends upward, while in a recessionary period, it may decline. [Modis \(2007\)](#) also finds a stable and positive correlation between the Dow Jones Industrial Index and U.S. GDP over the long term. This means that as the U.S. economy grows, there is a greater likelihood that the Dow Jones Industrial Index will also rise. This finding further validates the fact that there is a strong correlation between macroeconomic parameters and stock market growth. In summary, we can conclude that there is a significant and stable relationship between macroeconomic indicators and stock market performance for mature stock markets. The conclusion is of great significance for investors and policymakers to better understand and predict stock market volatility and invest accordingly. But, the same relation in less developed economies awaits more explorations.

2.2. Financial Market and Economic Development

[Patrick \(1966\)](#) suggests that over time, in a market-based economy where prices are used to distribute resources, the process of economic development is characterized by a rise in the quantity and diversity of financial institutions, as well as a significant increase in the proportion of money and total financial assets compared to GNP and tangible wealth. Commonly, statements reflect that the financial system adjusts to the growth of real per capita output. This perspective highlights the demand for financial services; as the economy expands, it creates new and additional demands for these services, which in turn lead to an expansion in the financial system's supply. From this standpoint, the scarcity of financial institutions in less developed countries is merely a reflection of the insufficient demand for their services.

Whether the development of the stock market enhances economic growth is a long-standing question, and numerous studies examine the influences of the financial market on economic growth. [Z. Xu \(2000\)](#) and [Šonje \(2002\)](#) present strong evidence suggesting that financial development is important to growth and that investment is an important channel through which financial development affects growth. [Hasan et al. \(2009\)](#), [Kim et al. \(2010\)](#), and [J. Zhang et al. \(2012\)](#) show that financial intermediary development leads to long-run convergence in the growth in both economic activity and productivity. Moreover, such convergence-enhancing effects of financial intermediation are stronger for less-developed countries than for more industrialized ones. [Barajas et al. \(2013\)](#) and [Botev et al. \(2019\)](#) show that the beneficial effect of financial deepening on economic growth in fact displays measurable heterogeneity. [Valíčková et al. \(2015\)](#) imply a positive and statistically significant effect of financial development on economic growth, but individual estimates vary widely. [Shahbaz et al. \(2022\)](#) show that the growth effects of financial development might be asymmetric and nonlinear according to the level of financialization of countries.

On the other side, some studies propose that financial markets do not provide direct support for economic development. [Rioja and Valev \(2004a, 2004b\)](#) develop the theoretical framework that financial development may affect productivity and capital accumulation in

different ways in industrial versus developing countries and show that in countries with very low levels of financial development, additional improvements in financial markets have an uncertain effect on growth. [Compton and Giedeman \(2011\)](#) show that stock markets do not perform the function of connecting financial development and economic growth. [Calderón and Liu \(2003\)](#) and [Peia and Roszbach \(2015\)](#) suggest that causality patterns between financial and economic development depend on whether countries' financial development stems from the stock market or the banking sector. [Popov \(2018\)](#) highlights the mechanisms through which financial markets benefit society, as well as the channels through which finance can slow down long-term growth.

2.3. Impact of Market Volatility on Overall Economy in Emerging Countries

In emerging markets, [Chun et al. \(2020\)](#) identify several unique economic and financial indicators that may lead to daily market volatility in an emerging economy. There is a distinct feature in fast-growing countries that stock market performance can affect the macroeconomy during development phases. However, evidence of the reversed relationship is sparse. [Bui and Doan \(2021\)](#) explore the impact of stock market development on economic growth among emerging markets and developing economies in Asia and demonstrate that stock market development exerts a positive impact on economic growth, confirming the importance of stock market development in improving efficient capital accumulation and allocation. [Hu et al. \(2022\)](#) investigate the effect of stock market growth and green economic growth and find that the stock market expansion index aligns with lower carbon pollution in BRICS countries. [Salisu et al. \(2023\)](#) explain the quality of policy signal matters regarding the predictive role of policy uncertainty in subsequent stock market volatility. While high economic policy uncertainty predicts high volatility, particularly when the signal quality is high, the positive relationship between economic policy uncertainty and volatility breaks down when the signal quality is low. [Keddad \(2024\)](#) investigates the relative influence of economic policy uncertainty in China, the U.S., and Japan on Asian stock market volatility and finds that Chinese economic policy uncertainty primarily influences the most developed markets. [Dorjdagva et al. \(2024\)](#) conduct a comprehensive examination of the relationships between stock market development and economic growth and investigate the existence of an independent association between economic growth and the composite index of stock market development in China. In recent years, academics have conducted extensive and in-depth research on the impact of macroeconomic factors on stock market volatility. Through the exploration of different perspectives and methods, we can better understand and predict the operation of the stock market and its correlation with the macroeconomy.

2.4. Stock Volatility and Rural Economy

Emerging economies are also known for their reliance on rural economic development ([Yan et al., 2025](#)). As a result, it merits being noted that the relationship between stock market volatility and rural economic conditions deserves investigation. Once again, there are few studies on the influences of the early-growth-stage capital market on the rural economy in a region, especially in terms of the impact of the volatility of stock market returns on rural regions in China. Theoretically, when listed companies in a region perform better, they can contribute positively to local macroeconomic factors such as employment and tax revenue, which in turn promote economic prosperity and wealth transfer to the rural areas. Moreover, when the share prices of listed companies in a region are volatile, they can attract the attention of investors and produce a diversion effect, increasing the exposure of other less volatile industries in that region and thus promoting the development of the rural economy. As an important financial market, the stock market plays an important role globally.

The volatility of stock prices directly reflects the expectations of market participants for the future earnings of and value changes in listed companies. Therefore, analyzing the impact of stock market volatility on rural economic development within a region can provide a better understanding of this link in theory and provide targeted recommendations for policymakers. First, when listed companies in a region perform better with higher returns and fewer risks, the economic benefits they bring are obvious. On the one hand, the good performance of listed companies usually means that they are more profitable, which will be directly reflected in increased employment opportunities. When firms are more profitable, they need more employees to meet the demand for production and services, thus providing more employment opportunities. This is particularly important for rural areas, as it can attract migrant workers to return home to start their own businesses or to find employment nearby, which in turn promotes rural economic development.

The better performance of listed companies also leads to increased tax revenue. As a company's profitability increases, its tax payments will increase accordingly. These tax revenues can be used by local governments for investment in infrastructure construction, education, healthcare, and other public utilities and indirectly promote the development of other industries in the region. For example, a region with better transportation networks or educational resources may attract more investment and talent to flow into the region, thus driving the development of other industrial chains. However, from another perspective, a more volatile stock market may also have a positive impact on the rural economy in a region. When the share prices of listed companies in a region are more volatile, they tend to attract the attention of investors. This may lead to a greater inflow of capital into the region, contributing to the development of the financial market. At the same time, investors may also turn to other industries to diversify their risks due to the uncertainty and opportunities associated with share price volatility. This will provide more exposure and growth opportunities for other industries in the region. In conclusion, the role of stock market volatility and regional capital market reforms for rural economies within a region is a complex and multi-faceted issue (Javaheri et al., 2022; Ayoub et al., 2022; Nikiforos, 2022; Dibor-Alfred et al., 2023; Tran et al., 2024). Theoretically, when a listed company performs better, it can contribute to macrofactors such as employment and tax revenue and promote economic prosperity; meanwhile, when the stock price fluctuates more, it can attract investors' attention and generate diversion, increase the exposure of other industries, and promote the economic development of the region. However, further analysis of the impact mechanism of stock market volatility on rural economic development in different contexts is needed, and corresponding policy recommendations should be put forward. Therefore, this paper puts forward the following hypothesis.

H1. *As long as other conditions are unchanged, when the volatility of listed companies' returns in a region rises, the rural GDP within the region will rise in that year.*

Next, we can derive that when a region has more listed companies, it becomes more attractive for investment and talent. This phenomenon can be called the "resource agglomeration effect", which is the concentration of factors of production in a particular region. This effect not only attracts more resources into the region but also promotes the productivity of the region. The first channel is fund flow. More listed companies in a region will induce capital inflow and create a virtuous cycle. Investors will see that the place has potential and put their capital into it. At the same time, these listed companies will be able to raise funds through stock issuance and other means to further expand their business scale and strength. In this way, resources will gradually be aggregated in the region. The second channel relates to the mobility and aggregation of talents. Listed companies in a region have labor demand, and skilled workers will go there for better employment

or entrepreneurship opportunities. This is because these large companies usually have better development prospects and career development opportunities and can provide better salaries and benefits. At the same time, talents working in the same industry will be more likely to attract and communicate with each other, resulting in the sharing of skills and experience. This talent agglomeration promotes corporate expansion in the region.

The third channel works through competition intensity. When a region hosts many publicly listed companies, they will compete in every way, which will constantly stimulate their governance and innovation. At the same time, due to the agglomeration of resources and talents, enterprises in the region can form industrial chains and cluster effects to improve their overall competitiveness. This will attract more investment and enterprises to the region, further promoting the prosperity of the local economy. To summarize, the “resource agglomeration effect” can be said to be one of the important factors for the rapid economic development of a region. Attracting resources and talents to a region facilitates the growth of the scale and strength of enterprises and drives the prosperity of the local economy. When considering investment or employment choices, we can focus on those regions that have more listed companies and hence stronger resource agglomeration effects. Based on these channels, we propose the below hypothesis.

H2. *As long as other conditions are unchanged, the number of listed companies in the region rises, and the “resource agglomeration effect” becomes more prominent, leading the region’s rural GDP to rise in the same year.*

According to the above analysis, listed companies have a positive and important influence on rural economic development. Listed companies can bring capital into rural areas, injecting new vitality into the local economy. These funds can be used to develop infrastructure, improve education and medical conditions, etc., thus improving the living standards of rural residents. The presence of listed companies will lead to the development of related industrial chains. As the scale of enterprises expands and productivity improves, more jobs will be created, which will directly promote the employment and income growth of residents. Listed companies can also promote technological innovation and knowledge transfer, playing a positive role in enhancing the competitiveness of local industries.

However, when considering the impact of listed companies on the rural economy, we must also note the existence of crowding-out effects. The presence of a listed company may affect local traditional industries to a certain extent, leading to the reallocation of resources and the restructuring of industries. Specifically, when a listed company is established and begins operations in a rural area, it may attract a large amount of capital and labor resources. This concentration of resources may cause capital and manpower originally invested in local traditional industries, such as agriculture and handicrafts, to shift to the listed company, thus impacting these traditional industries. With the transfer of resources, these traditional industries may face a shortage of capital and a loss of manpower, which will in turn affect their normal operation and development. In addition, the entry of listed companies may also bring about adjustments in industrial structure. In order to adapt to market demands and competition, listed companies often introduce advanced technology and management experience, which may make some traditional industries appear backward and uncompetitive. Therefore, in order to survive and develop, local traditional industries may have to undergo reforms and upgrading or transform into other more promising fields. Combining these two factors, the optimal market structure to reduce the crowding-out effect is one large firm (leading firm) and many small firms (following firms) in one area. In this case, the leading firm would not waste resources in over-competition with other large firms and make full use of local resources for local economic growth. The following

firms supply industrial diversity and accelerate the transition from traditional industry to modern industry.

H3. *As long as other conditions are unchanged, there are two ways of promoting rises in rural GDP: rises in the volatility (dispersion of distribution) of the return of listed companies and rises in the number of listed companies in the region. These can function together without producing a crowding-out effect.*

Given the validity of the above three hypotheses, this study provides insights into the following aspects. First, elevated market volatility within a region may boost the rural economy of the region in the current year, even when all else is equal. This phenomenon may be related to the opportunities and challenges posed by market volatility. For rural economies, market volatility may provide increased opportunities for the marketing of agricultural products and can incentivize farmers to seek new avenues for economic growth. In addition, market volatility can stimulate entrepreneurship and innovation, which can play a positive role in promoting rural economic development. The second question is whether the “resource agglomeration effect” of listed companies in a region can increase the rural GDP of the region and whether this effect has a risk diversification function. Studies have shown that the concentration of listed companies in a region may create an industry-level agglomeration, thus enhancing the overall economic development of the region. In rural areas, the aggregation of listed companies often brings more investment and employment opportunities and enhances rural GDP through technological innovation and resource allocation optimization. In contrast, such agglomeration can also spread risks, as the challenges and risks faced by different firms may differ, thus reducing the risk pressure on the regional economy. Third, whether the resource agglomeration effect can work together with the risk diversification effect and whether one effect would crowd out another is also unclear. This study shows that these two effects generated by considering the synergy of all listed firms in a region can function simultaneously and that there is no significant crowding-out effect between them. Specifically, in the process of rural economic development under market volatility, the agglomeration effect of listed companies can still play a positive role and is not offset or replaced by market volatility. Instead of canceling each other out, these two effects corroborate each other, making rural economic development more stable and sustainable.

3. Empirical Data and Methodology

3.1. Data Sources and the Sample

The sample used in this paper is a balanced panel dataset from 1996 to 2021, and the study scope contains 283 prefectural-level cities under the jurisdiction of 31 provincial-level administrations in mainland China. The data needed for this paper can be categorized into two bulks. The first includes macroeconomic indicators for rural areas, which were measured using annual city GDP minus municipal district GDP. The second set of data quantifies market risk, including the location of its headquarters and the return of its corresponding A-share issuance. For collecting regional macroeconomic data, we relied on data from the China Urban Statistical Yearbook (1996 to 2021) published by China National Knowledge Infrastructure for 289 cities in 31 Chinese provinces. Turning to the firm-level characteristics of publicly listed companies, we obtained the regions where the headquarters of China’s A-share listed companies are located and their stock returns from the CSMAR database.

3.2. Empirical Model and Variable Construction

To verify the hypothesis of how the risk of listed companies and the resource agglomeration effect of listed companies affect regional macroeconomic development in the hypothesis development part, the empirical specification is given by

$$GDP_{i,t} = \alpha_0 + \alpha_1 RET_{i,t} + \beta V_{i,t} + \varepsilon_{i,t}. \quad (1)$$

In Equation (1), the stock return and high-order volatility of listed companies are the explanatory variables, which are calculated by the average monthly return of all listed firms located in a region every year (RET) and by a vector of market fluctuation proxies (V), respectively. In this paper, the variance (VAR), skewness ($SKEW$), and kurtosis ($KURT$) of the annual monthly returns of listed companies are selected as component proxies of the market volatility vector, i.e., $V = (VAR, SKEW, KURT)^T$. The gross domestic product (GDP) of the rural areas in a region during a given year is the dependent variable, and ε is the usual residual term. i and t mean the i th region and the t th year, as follows. In addition, when the clustering effect of listed companies is considered, Equation (1) becomes

$$GDP_{i,t} = \alpha_0 + \alpha_1 RET_{i,t} + \beta V_{i,t} + \alpha_2 N_{i,t} + \varepsilon_{i,t}. \quad (2)$$

where N in Equation (2) denotes the number of listed companies in a region. Considering the high degree of correlation between the variance (VAR), skewness ($SKEW$), and kurtosis ($KURT$) in the cross-section of all listed firms within a region, this paper integrates these three volatility indicators of the annual monthly returns of listed companies into a single degenerated volatility indicator, $TOTVOL$, using the principal component analysis (PCA) method. Thus, we have

$$TOTVOL_{i,t} = w_1 VAR_{i,t} + w_2 SKEW_{i,t} + w_3 KURT_{i,t}. \quad (3)$$

In the above Equation (3), w_k is determined by weight estimates generated by the PCA outputs. In particular, w_1 , w_2 , and w_3 are, respectively, associated with the variance (VAR), skewness ($SKEW$), and kurtosis ($KURT$) components. Our final empirical specification can be simplified from the estimation specification (2) to Equation (4) below:

$$GDP_{i,t} = \alpha_0 + \alpha_1 RET_{i,t} + \beta TOTVOL_{i,t} + \alpha_2 N_{i,t} + \varepsilon_{i,t}. \quad (4)$$

4. Results and Analysis

4.1. Descriptive Statistics

Table 1 provides descriptive statistics for the explanatory and dependent variables. As for the GDP variable, which reflects regional macroeconomics, there are indeed large differences in the degree of development across regions. Eastern provinces have the highest rural GDP, exceeding RMB 2 trillion in 2021, which is several hundred times higher than western provinces with the lowest rural GDP. The highest GDPs are in rural areas surrounding Shanghai and Beijing, reaching RMB 4.32 and 4.03 trillion in 2021. RET represents the average monthly return on A-shares of listed companies headquartered in a region over the course of a year. As can be seen from the statistics, there is also a clear disparity in stock returns. At the provincial level, the average monthly return for provinces with better stock performance can reach more than 3.2% and up to 9.6% annualized return, whereas provinces with worse performance suffer losses of almost 1.5% and have up to a −4.1% average monthly loss. The difference is even more pronounced at the city level, where the average monthly return for cities with better stock performance can reach a

maximum of more than 10%. However, relatively poorer performers can only reach average monthly losses of almost 5 percent at most.

Table 1. Descriptive statistics.

Variable	No. of Obs.	Mean	Std. Dev.	5% Percentile	25% Percentile	Median	75% Percentile	95% Percentile
Provincial level								
GDP (trillion RMB)	688	0.956	5.882	0.005	0.054	0.221	0.617	2.399
RET	688	0.014	0.042	−0.041	−0.015	0.009	0.032	0.096
VAR	688	0.010	0.012	0.002	0.004	0.007	0.012	0.030
SKEW	688	0.187	0.827	−1.118	−0.331	0.126	0.619	1.762
KURT	688	0.550	1.873	−1.464	−0.807	−0.026	1.387	4.388
N	688	40.70	76.22	1.3	5.3	13.8	36.2	191.2
City level								
GDP (trillion RMB)	6261	0.065	0.087	0.003	0.013	0.035	0.084	0.225
RET	6261	0.016	0.057	−0.052	−0.017	0.010	0.037	0.103
VAR	6261	0.021	0.098	0.003	0.006	0.010	0.019	0.050
SKEW	6261	0.241	0.856	−1.136	−0.282	0.187	0.747	1.728
KURT	6261	0.632	1.943	−1.399	−0.697	0.106	1.377	4.538
N	6261	5.52	17.28	1	1	1.83	3.92	19.67

Source: authors' own calculations.

Next, we discuss three variables that describe the stock market risk cross-sectionally within a region. *VAR* measures the variance of the return distribution, *SKEW* measures the skewness of the return distribution, and *KURT* measures the kurtosis of the return distribution. As can be seen in Table 1, the volatility of the distribution of their returns varies considerably, both for the average returns of stocks within a province and for the average returns of stocks within a city. Especially when the extreme values appear, i.e., the maximum values of *VAR* and *KURT*, as well as the minimum and maximum values of *SKEW*, the distributions of the statistical values display obvious jumps. These observations show that there exist cross-regional differences in the volatility of the returns of the publicly listed companies in the stock market.

N measures the number of listed companies within a region, and it varies greatly from region to region. The median number of listed companies is 13.8, but most of the underdeveloped provinces have numbers of firms that are less than 5. In contrast, the more developed provinces have more than 30 companies, and financial centers such as Beijing and Shanghai have more than 200 companies. There are fewer listed companies within cities overall, but the uneven trend in the distribution is like that within provinces.

4.2. Correlation Estimation

Table 2 reports the Pearson correlation estimates of the explanatory variables in Equations (1) and (2). From the figures, the average return and variance used in the conventional return–volatility analysis have a high positive correlation (0.428 at the province level and 0.493 at the city level), which captures the risk-aversion characteristic of the classical risk–return tradeoff theory. In addition, when the higher-order volatility of the return distribution is considered, the variance, skewness, and kurtosis have more pronounced positive correlations. This is consistent with the empirical results obtained in the literature. In addition, there is essentially no correlated relationships between returns, volatility, and the number of firms in any given region. The statistics in Tables 1 and 2 demonstrate a rough link between rural macroeconomic indicators and financial market performance,

but a more formal empirical analysis still needs to be performed through the regression specification in the next subsection.

Table 2. Correlation coefficient estimates.

Provincial Level					
	<i>RET</i>	<i>VAR</i>	<i>SKEW</i>	<i>KURT</i>	<i>N</i>
<i>RET</i>	1	0.428 (<0.0001)	0.047 (0.3522)	0.184 (0.0002)	0.038 (0.4479)
<i>VAR</i>		1	0.213 (<0.0001)	0.304 (<0.0001)	0.003 (0.9461)
<i>SKEW</i>			1	0.292 (<0.0001)	0.092 (0.0648)
<i>KURT</i>				1	0.026 (0.6075)
City Level					
	<i>RET</i>	<i>VAR</i>	<i>SKEW</i>	<i>KURT</i>	<i>N</i>
<i>RET</i>	1	0.493 (<0.0001)	0.143 (<0.0001)	0.142 (<0.0001)	0.022 (0.4502)
<i>VAR</i>		1	0.286 (<0.0001)	0.322 (<0.0001)	0.003 (0.9176)
<i>SKEW</i>			1	0.375 (<0.0001)	0.037 (0.2028)
<i>KURT</i>				1	0.011 (0.7155)

Source: authors' own calculations.

4.3. Regression Results

Table 3 reports the regression results of the empirical Equation (1). The effect of the stock returns of listed companies in the region on GDP is negative and insignificant, while the variance of the stock returns of listed companies in the region exerts a positive effect on GDP with a 10% significance level. This verifies the assertion in Hypothesis 1 that when the fluctuation in listed companies' returns in a region rises, the rural GDP of the region for that year will rise. Meanwhile, by comparing the provincial and urban analyses, we find that the effect of variance on the average rural GDP within cities is even more significant, with a t-value about 50% higher than that in the provincial analysis.

When we introduce higher-order moments of the earnings distribution, this positive effect of variance decreases significantly, and skewness and kurtosis have a non-significant effect on the explanatory variables. In Table 3, the coefficients of skewness and kurtosis of listed companies' stock returns on provincial GDP are 0.069 and -0.007 , respectively, and both are insignificant, which explains that the higher-order volatility of listed companies' stock markets does not have a significant impact on rural macroeconomics within the provinces. On the other hand, the skewness of the stock returns of listed firms within cities positively affects the average local rural GDP and the significance is close to 5%, which suggests that the higher-order volatility of large local firms in the capital market also plays a significant role in the development of the local rural economy when the regional scope is reduced.

In addition, the last two rows of Table 3 report the F-values and adjusted R^2 values of the regression analysis. From the results, in the regression model, the explanatory variables have a significant effect on the average rural GDP within the city, but by adding skewness and kurtosis as measures of stock volatility, stock market risk does not give rise to a significant increase in its explanatory power for rural GDP.

Table 3. Baseline regression results.

	Intra-Provincial Average Rural GDP				Intra-City Average Rural GDP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>RET</i>			−0.283 (−0.20)	−0.216 (−0.15)			0.203 (0.20)	0.185 (0.18)
<i>VAR</i>	5.178 * (1.77)	3.097 (1.49)	5.456 * (1.69)	4.833 (1.43)	5.602 *** (2.96)	4.819 ** (2.37)	5.389 ** (2.47)	4.623 ** (2.00)
<i>SKEW</i>		0.069 (0.90)		0.068 (0.89)		0.092* (1.91)		0.092 * (1.91)
<i>KURT</i>		−0.001 (−0.04)		−0.001 (−0.03)		−0.011 (−0.52)		−0.011 (−0.52)
Cons.	0.735 *** (9.64)	0.728 *** (9.49)	0.734 *** (9.55)	0.727 *** (9.40)	0.932 *** (17.77)	0.926 *** (17.61)	0.933 *** (17.62)	0.927 *** (17.46)
No. of Obs.	688	688	688	688	6261	6261	6261	6261
F-Statistic	3.15	1.33	1.59	1.00	8.74	4.14	4.38	3.11
Adj. R ²	0.005	0.002	0.003	0.000	0.007	0.008	0.006	0.007

Note: ***, **, and * represent 1%, 5%, and 10% significance levels, respectively, and numbers in parentheses are t-values for two-tailed tests. Source: authors' own calculations.

Table 4 reports the regression results of the empirical setups (2) and (4) in Section 3.2. One can read from the results that the number of listed companies in the region and the principal component of volatility measures, *TOTVOL*, have a significant positive effect on GDP, and this result remains significant at the 5% and 1% significance levels. In addition, when *N* is introduced into the regression model, the effect of aggregate risk in the province analysis remains significant, which verifies the idea in Hypothesis 2 that an increase in the number of listed companies in the region increases the average rural GDP in the region, and an increase in the number of listed companies in the region does not attenuate the effect of the company's stock price volatility on the average rural GDP.

Table 4. Regression results after controlling for firm number.

	Intra-Provincial Average Rural GDP				Intra-City Average Rural GDP			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>RET</i>	−0.564 (−0.41)			−0.650 (−0.48)	0.093 (0.09)			0.762 (0.82)
<i>VAR</i>	5.450 * (1.67)				4.777 ** (2.08)			
<i>SKEW</i>	0.029 (0.39)				0.085 * (1.78)			
<i>KURT</i>	−0.001 (−0.03)				−0.012 (−0.52)			
<i>N</i>	0.012 *** (5.61)		0.012 *** (5.62)	0.012 *** (5.63)	0.012 *** (2.85)		0.012 *** (3.94)	0.012 *** (3.91)
<i>TOTVOL</i>		2.170 ** (2.15)	2.001 ** (2.06)	2.208 ** (2.08)		3.337 ** (2.52)	3.360 ** (2.55)	3.017 ** (2.18)
Cons.	0.653 *** (8.62)	0.623 *** (5.60)	0.562 *** (5.22)	0.550 *** (4.97)	0.901 *** (16.93)	0.996 *** (24.03)	0.969 *** (23.19)	0.963 *** (22.76)
No. of Obs.	688	688	688	688	6261	6261	6261	6261
F-Statistic	7.15	4.63	18.31	12.26	5.48	6.34	10.953	7.53
Adj. R ²	0.071	0.009	0.079	0.078	0.019	0.005	0.017	0.016

Note: ***, **, and * represent 1%, 5%, and 10% significance levels, respectively, and numbers in parentheses are t-values for two-tailed tests. Source: authors' own calculations.

Meanwhile, by comparing the provincial and urban analyses, we find that the significance of the effect of the number of listed companies in the region on the average rural GDP in the city becomes smaller, about 75% of that in the provincial analysis. However, the effect of the principal component risk, *TOTVOL*, turns out to be the opposite, with a

greater impact on the average intra-city rural GDP, with a coefficient that is about 1.5 times higher than that in the provincial analysis and a significant increase in significance.

In addition, in Table 4, the F-values and adjusted R^2 values are substantially higher for the provincial-level analysis, especially when the number of listed firms in the region is incorporated as an additional explanatory variable. Thus, the company agglomeration effect has a significant effect on promoting rural economic development.

Finally, we conducted the following mechanism test to substantiate the causal relationship between stock market performances and rural GDP growth and to give the reader an idea of the local reality of our argument. The concerned impact is mostly indirect and functions through the following two potential channels. First, stock market fluctuations affect the credit policies of banks and other financial institutions; when the stock market is in a trough, banks may tighten credit, making it more difficult for rural businesses and farmers to raise funds and affecting rural economic activity. Moreover, stock market volatility affects farmers' expectations of future income, which may lead them to reduce investment and consumption, further affecting the rural economy.

To examine the validity of the above proposed channels, we further tested the impacts of stock market performances on rural GDP growth during market downtrends. We chose four years as market downtrends in China, which were 2008 (global financial crisis), 2015 (Chinese stock market crash), 2018 (China–U.S. competition), and 2020 (impact of COVID-19). The provincial results are shown in Table 5 below.

Table 5. Regression results of mechanism exploration.

	Intra-Provincial Average Rural GDP			
	(1)	(2)	(3)	(4)
<i>RET</i>	4.623 *			5.288 **
	(1.78)			(2.18)
<i>VAR</i>	3.937			
	(0.88)			
<i>SKEW</i>	−0.290			
	(−1.20)			
<i>KURT</i>	0.074			
	(0.70)			
<i>N</i>	0.114 ***		0.114 ***	0.112 ***
	(6.77)		(6.74)	(6.79)
<i>TOTVOL</i>		1.546	2.980	2.063
		(0.59)	(1.39)	(0.96)
Cons.	0.571 ***	1.050 ***	0.547 ***	0.567 ***
	(3.16)	(7.75)	(4.09)	(4.32)
No. of Obs.	93	93	93	93
F-Statistic	10.69	0.35	23.00	17.56
Adj. R^2	0.345	−0.007	0.324	0.351

Note: ***, **, and * represent 1%, 5%, and 10% significance levels, respectively, and numbers in parentheses are t-values for two-tailed tests. Source: authors' own calculations.

During market crash times, market returns become main factors that affect rural GDP because farmers do not care about market stability but are only concerned with market growth, which provides financial support to rural development. Compared to whole-sample regression which suggests that the main impacts on rural GDP growth are due to market volatility, the results in this paper provide evidence of the effects of stock market performances on rural GDP growth in China; that is, rural GDP growth depends on stock market volatility during normal times, but farmers are concerned with stock returns more during market crashes.

4.4. Further Discussions

In summary, the above econometric analysis verifies the three testable hypotheses of this paper, the first of which is to explore how rural GDP within a region changes when fluctuations in the returns of listed companies in that region increase. Given that all other potential determinants are constant, we hypothesize that when the volatility of listed companies' returns in a region increases, rural GDP within that region will increase. There are several reasons behind the holding of this hypothesis. First, when the volatility of listed companies' returns increases in a region, it indicates that there is more economic activity in the region. This could be due to optimistic investor expectations about the region's economic prospects or increased volatility in the financial markets. In either case, this economic activity has a positive impact on the rural economy.

Secondly, when there are more listed companies within a region, it indicates that the region is highly attractive for investment and talent. According to the basic principles of macroeconomics, talent and capital are two of the most important factors in the allocation of various resources to promote economic development. Therefore, when a region has more listed companies, it can be inferred that the region has a more rapid rate of economic development. We call this phenomenon the "resource agglomeration effect". This effect can attract more resources into the region, including investment, technology, and talent. The inflow of these resources will provide more opportunities and development space for rural areas, thus promoting the growth of rural GDP. Therefore, based on the above analysis, we propose that the number of listed companies in the region increases, the resource agglomeration effect is more prominent, and the rural GDP in the region will increase. It is important to note that both the fluctuation in listed companies' returns and the increase in the number of listed companies achieve an increase in rural GDP by enhancing the exposure of the region. This implies that the two modes of influence may be correlated and may have a crowding-out effect.

When compared to outcomes that have been previously documented in the existing body of the academic literature, this particular paper presents several novel findings that are worth noting. To begin with, the research conducted in this paper demonstrates that improved stock market performance has a positive effect on the growth of the rural economy. This correlation is in line with the findings that have been previously established in the literature. Secondly, this paper pioneers an exploration into the effects of stock market volatility on economic growth, with a particular emphasis on how these fluctuations impact rural areas. This contribution offers new insights and directions for future research within this field. Lastly, the paper establishes a connection between the development of the rural economy and the concept of crowding-out effects, thereby presenting a novel perspective that could be beneficial for policymakers when considering strategies for rural economic advancement.

Therefore, in this paper, we attempt to synthesize the impact of these two scenarios on the rural economy in a region and explore the path of listed companies' impact on rural economic development. Thus, we propose a third testable hypothesis in which listed companies' return fluctuations and increase in number in a region can collaborate, and such collaboration will not be affected by the crowding-out effect. In other words, both the cross-sectional dispersion of returns and more publicly listed firms in a region can jointly promote the growth of rural GDP in a region. By studying these three aspects in depth, we can better understand the mechanism of listed companies' influence on rural economic development and provide references and suggestions for related policymaking. The statistical analysis methods and economic modeling tools used in this section validate these three research hypotheses, and in the next section, we conclude by analyzing how they work together to promote rural economic growth. Therefore, this study has important

theoretical and practical implications and is expected to provide valuable references for academics and policymakers in related fields.

Although other macrofactors such as globalization, climate change, changes in geopolitical relations, and pandemics' effects on rural growth are taken care of in the fixed effects of the baseline model and in the mechanism exploration tests, there exist opportunities and challenges that rural regions in China may face in the implementation of specific growth models. Opportunities for rural economic development mainly come from new technology. Rural regions can leverage technology and innovation to modernize agriculture, improving productivity and value-added activities, in which companies in agriculture tech or food processing listed on the stock market can attract investment, driving innovation and creating spillover effects in rural areas. Furthermore, the rise in e-commerce platforms can enable rural producers to access larger markets, boosting income and reducing poverty. In this case, the strong stock market performance of e-commerce companies can incentivize further investment in rural logistics and digital infrastructure.

The challenges for rural economic development in China mainly rest on limited resources for rural development. Rural businesses often struggle to secure financing due to underdeveloped financial infrastructure and higher perceived risks. A poorly performing stock market can exacerbate this issue by reducing investor confidence and limiting capital flows to rural projects. Moreover, rural producers often lack access to larger markets and real-time information, limiting their competitiveness. To solve this issue, a robust stock market can support the growth of logistics and information technology companies, improving rural market access.

5. Conclusions and Implications

To explore the role of listed companies in the rural economies of the firms' regions in the context of resource allocation, this paper utilizes data from 31 provincial administrative regions and 283 prefecture-level cities in China from 1996 to 2021 to analyze the impact of market risk on rural economic development. It is found that market risk has a significant impact on the rural economy and that this impact exhibits some spatial variability. In analyzing the impact of market risk on rural economic development, this paper finds that financial capital plays an important role in this process. The results reveal three implications if all other conditions are maintained. First, when the fluctuation in the returns of listed companies in a region rises, the average rural GDP of that year will rise. Second, the "resource agglomeration effect" of listed companies in a region can increase the GDP of that region. Third, this effect does not diminish the positive impact of the companies' stock price fluctuations on GDP, thus generating a synergistic impact.

Listed companies can drive the economic development of the region in which they are located. Specifically, financial capital has a direct or indirect impact on the rural economy in a region through three paths. The first path is that financial capital is directly invested in the rural economy. With the continuous improvement and expansion of the financial system, more and more financial institutions have begun to focus on rural areas. These financial institutions provide various forms of loans and credit services, providing financial support for rural enterprises and individuals. This direct input can promote the development of the rural economy and lead to the growth of related industries and employment. The second path is the indirect impact of financial capital on the rural economy. As the capital market continues to develop and grow, financial capital indirectly influences the development of the rural economy by investing in rural-related industries. For example, financial institutions can participate in the development of rural enterprises through equity investment, bond investment, and other ways to provide financial and resource support. This indirect impact can further promote the growth and upgrading of

the rural economy. The third path is the impact of financial capital on the rural economic environment. The process of intra-regional flow and allocation of financial capital produces certain changes in the rural economic environment. For example, the entry of financial institutions brings more financial products and services, which improves the convenience of rural residents in accessing financial resources; at the same time, it also introduces more advanced management concepts and technologies, which promotes the optimization of rural economic structure and transformation (Long & Zhang, 2024). This paper also puts forward the methods of the capital market aiding the rural economy. Firstly, the coverage and service capacity of financial institutions in rural areas should be strengthened, and corresponding policies and measures should be formulated to encourage financial institutions to expand credit investment in rural areas (Melcangi & Sterk, 2024). Secondly, emphasis should be placed on enhancing the development level of rural financial markets, improving relevant laws, regulations, and regulatory mechanisms, and building a sound financial market system (R. Xu et al., 2024). In addition, the universality and convenience of rural financial services can be promoted by strengthening financial innovation and the application of science and technology (Y. Zhang et al., 2022).

Such a conclusion links the market performance of listed companies and rural economic development within a region, which has a very important revelation for the allocation of agricultural resources between a company and a region as well as for rural economic development within the region. Firstly, listed companies strongly attract talents and funds, and from the empirical results of this paper, listed companies can indeed promote the economic development of the region they are located in. In addition to the direct effect of the efficient and stable development of listed companies on the regional economy, when the share price of listed companies fluctuates greatly, it can attract the attention of investors, produce a diversion effect, and increase exposure for other industries in the region, thus promoting the development of the regional economy. Therefore, it is necessary to fully utilize the social resources of listed companies for the radiation effect of the surrounding areas and improve the efficiency of the use of social resources. Secondly, the “resource agglomeration effect” of listed companies in a region can increase the GDP of the region. On one hand, this shows that China’s regional construction is still far from the goal of modernization in many indexes, and on the other hand, it also points out the direction for future work. At present, the development of modern company systems and the construction of global financial centers are in line with the problems reflected in the data of this paper, so discovering the problems, summarizing the problems, and solving the problems through the data will bring help to future regional economic construction. Finally, the two ways of promoting the rise in rural GDP, namely the rise in yield volatility and the rise in the number of listed companies in a region, can collaborate and do not have a crowding-out effect. The empirical part is validated by data from Chinese provincial-level administrative regions and prefecture-level cities. The two paths through which listed companies have a facilitating effect on rural economic development in a region are explored, i.e., resource agglomeration and risk diversification. After exploring the mechanism of listed company stock volatility and scale in the regional rural economy, we shed light on current financial assistance for Chinese rural economic development. In the present society where all aspects are profoundly changing, the performance of listed companies convey signals to the market by maintaining the stability of the capital market and brand demonstration, thus affecting regional development.

The primary constraints in our analysis stem from the inherent data limitations associated with the rural economy, as well as the potential misalignment between publicly listed companies and specific geographic areas. Given the complexity and challenges involved in directly collecting GDP data from rural regions, our methodology involves subtracting

the GDP generated by urban areas from the total GDP to estimate rural GDP. However, this approach may introduce inaccuracies and potential biases (i.e., this subtraction may overestimate the rural GDP because the total GDP may contain other non-urban economic activities and the existence of pervasive statistical discrepancies), particularly in certain urban centers where economic activities are more pronounced. Furthermore, the task of aligning companies with their respective rural regions becomes arbitrary because most firms are situated within the urban areas. Moving forward, there is a clear opportunity to refine our computational methods and classification schemes to enhance the precision and reliability of our results.

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Notes

- ¹ Agglomeration is a key concept in human geography, referring to the spatial concentration of economic activities and associated populations in particular geographic areas. The notion of resource agglomeration encompasses more than merely the clustering of labor inputs; it also includes other inputs, as well as technologies and institutions that are needed in the production process. This phenomenon is mainly propelled by the advantages of proximity, including diminished transportation expenses and the promotion of information spillover.
- ² Diversification is a strategy that mixes a wide variety of investments within a portfolio to reduce portfolio risk. In our setup, it can be achieved by purchasing investments in different industries, sizes of companies, business lines, or types of investment tools.
- ³ The crowding-out effect was originally used in macroeconomics to refer to rising public sector spending driving down private sector spending. We use this term here to describe the potential phenomenon that the risk-diversification effect might be reduced by the resource agglomeration effect brought up by hosting several publicly listed firms in a region. The reason is that, at first glance, agglomeration is the opposite of diversification. However, in the present study, the agglomeration of resources coexists with diversified inputs and business models for the rural economy.

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