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The impact of stock market development on economic growth

Li Yao

Business School, Southwest Jiaotong University Hope College, Chengdu, Sichuan, China
liyao11@hotmail.com

Abstract: *This article examines the relationship between stock market variables and economic growth across different countries. The findings reveal a positive correlation between these variables, albeit with varying degrees of impact on economic growth depending on the country. Notably, the study finds that the stock market's relevance to economic growth is generally weak, with a slightly higher correlation observed in high-income economies compared to low-income ones. The article further analyzes the mechanisms through which the stock market influences economic growth, including its impact on capital productivity, provision of financial support for technological innovation, and facilitation of mergers and acquisitions. The stock market also affects companies' investment behavior through market price changes and influences society's saving and consumption patterns. While the empirical analysis confirms a significant positive correlation between the stock market and economic growth, the interaction is not always beneficial. A booming stock market can stimulate consumption and promote economic development, but a sluggish market can hinder growth. Understanding and leveraging the interaction between the stock market and the macro economy can enhance macroeconomic regulation and control, fostering mutual reinforcement between finance and the economy.*

Keywords: *stock market; economic growth; mobility*

1. Introduction

Since twenty-first Century, with the development of capital market, most of us have experienced the transformation of bull and bear and the collapse of stock market bubble and economic recession. The prosperity and recession of the stock market have a profound impact on the production of enterprises and the quality of life of everyone. In a bull market, the investment income of enterprises increases, and the residents get high dividends. In a bear market, a large number of enterprises break their capital chain. Due to the lack of cash flow, they fail to survive and employ workers. The stock price falls all the way, and the enterprises are facing bankruptcy, And individuals will lose their jobs, and their income will be greatly reduced. Such a similar impact is like COVID-19 in the past two years, which concerns individuals and countries. Therefore, The impact of the stock market on the economy has always been a research hotspot .The existence of the stock market is unnecessary because there are no transaction costs or information costs (Arrow and Debreu ,1954)[1]. The real world is not so perfect and ideal. It is full of information asymmetry and transaction costs. However, Levin’s analysis shows that a well-functioning financial system can reduce market transaction costs, make information flow more smoothly, and thus have an impact on investment activities.

The stock has some characteristics. Its liquidity is much stronger than that of the real estate market, and companies can achieve more large-scale cross-border development through stock market financing. Therefore, with the deepening of economic development, the function of the stock market is also developing and emerging, and its stronger function is reflected in economic growth.Some scholars believe that the speed and quality of a country's economic development can be reflected in the rise and fall of the stock market.

At the end of the 19th century, research about the interaction of finance and economy has emerged, but researchers have paid more attention to the role of banks in the financial field.Some scholars believe that the existence of banks is very important, in addition to their basic functions, they can also promote financial innovation. On the contrary, some studies suggest that the interaction between banks and the economy is not active. Comparatively speaking, the empirical research on the interaction between economic and stock market started late. Among them, most of the research is from the following three aspects:In the aspect of information production, Grossman et al have proved that the difficulty of making

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profits from information is related to the size and liquidity of the stock. Similarly, the stock market can strengthen corporate's management power (Jensen and Meckling ,1976)[2]. In the aspect of risk response, some scholars emphasize that the stock market is conducive to risk diversification, and the portfolio that leads to risk aversion can include high expected return and high-risk investment projects (Stoll, 1996)[3].

Many factors can affect economic growth. Research data from the US capital market shows that 43% of output growth can be explained by stock returns (Fama and French,1993)[4]. There is a positive correlation between financial development and economic growth, and further research in this field should be deepened (Levine,1997)[5].The liberalization of capital control has a positive driving effect on the development of the stock market, which is an important driving force for economic growth (Levine and Zervos,1998)[6].There is a significant bidirectional causal relationship between stock market development and economic growth in India. The stock market provides important support for economic growth through its financing and information transmission functions; Meanwhile, economic growth has also driven further development of the stock market (Agrawalla and Tuteja,2007)[7].Summarized the intrinsic connection between the development of the stock market and economic growth, and emphasized the important role of the stock market in promoting economic growth (Li,2006)[8].There is a significant positive correlation between the development of China's capital market and economic growth. The maturity and development of the capital market can effectively promote economic growth, especially in terms of resource allocation and financing efficiency (Li and Xue, 2004)[9].The complex interactive relationship exists between financial development and economic growth, rather than a one-way causal relationship. Financial development can promote economic growth, while economic growth also provides impetus for financial development (Lv,2018)[10].The healthy development of the stock market helps to improve financing efficiency and achieve effective allocation of resources through financial intermediary mechanisms, thereby promoting economic growth (Tao, 2013)[11].

Most research findings suggest that stock market development has a positive impact on economic growth, but these studies are limited to developed or developing countries and do not provide a comprehensive analysis of all countries. Therefore, this article attempts to study the relationship between stock market development and economic growth by using economic data from different countries.

2. Data and Measurement

2.1 Sample selection

This article uses data from 60 countries from 1990 to 2017, 30 of them are low-income countries , and 30 high-income . There are two reasons for choosing 1990 as the starting point. First, many emerging stock markets have a relatively short development time, and the trading volume in previous years and the number of listed companies are too small, which makes the analysis meaningless. Second, we are unable to obtain relevant data on transactions in previous years, so we lack the index value of the stock market in these years. At the same time, we also need to check the efficiency of the stock market from time to time.

2.2 Selection of indicators

In order to carry out empirical analysis, a number of variables that quantify the quality of the stock market and economic growth are constructed.

The research in this article takes GDP growth rate as a measure of economic growth, expressed in GDPght.

This article uses scale index and liquidity index to measure the quality of the stock market. They are market capitalization rate, turnover rate and transaction ratio.

Market capitalization rate (MCAP):

An index reflecting the stock market size, defined as market capitalization divided by GDP . The higher the capitalization rate of the stock market, the larger the scale of savings in the market, and the stronger the ability to mobilize capital. That is, the scale of the stock market is expected to be positively correlated with economic growth.

Turnover rate (TOR)

An indicator that measures the liquidity of the stock market is defined as total stock trading divided

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by market value, where total stock trading refers to the total trading volume of all listed stocks each year.

Transaction ratio (TVT)

It measures the ratio of stock transaction volume to economic scale, defined as follows: transaction ratio = total stock transaction / gross domestic product.The stock liquidity index measures the relative size of the stock exchange market compared to GDP.

2.3 Data Source

The GDP growth rate is derived from the World Development Indicators of the World Bank, and the market capitalization rate, turnover rate and transaction ratio are derived from the Global Financial Development Database of the World Bank. The sample period is from 1990 to 2017, all of which are annual statistical data using Stata software for empirical analysis.

(1) Model

Let GDPght represent economic growth, MCAP represent the market capitalization rate, TOR represent the turnover rate, and TVT represent the transaction ratio. The linear regression model is established as:

model (1) :Test the relationship between MCAP and GDPght:

$$GDPght_{it}=\alpha+\beta_1 MCAP_{it}+u_{it} \quad (1)$$

model (2) :Test the relationship between TOR and GDPght:

$$GDPght_{it}=\alpha+\beta_1 TOR_{it}+u_{it} \quad (2)$$

model (3) :Test the relationship between TVT and GDPght:

$$GDPght_{it}=\alpha+\beta_1 TVT_{it}+u_{it} \quad (3)$$

model (4) :Test the relationship between MCAP TOR TVT and GDPght:

$$GDPght_{it}=\alpha+\beta_1 MCAP_{it}+\beta_2 TOR_{it}+\beta_3 TVT_{it}+u_{it} \quad (4)$$

Among them, α is a constant term, and u_{it} is a random disturbance term. In order to facilitate comparison with scatter diagram analysis, no other control variables are added here.

3. Empirical Results and Analysis

3.1 Descriptive statistical

Table 1 reveals the descriptive statistical results of each variable. It shows that the volatility (standard deviation sd) and average level (mean) of GDP growth rate is the smallest among all indicators. The most volatile is the turnover rate TOR (sd=57.23), followed by the market capitalization rate MCAP (sd=46.45).

Table 1: Descriptive statistics.

VARIABLES	N	mean	sd	min	max
GDPght(%)	1,381	4.148	3.707	-13.13	33.99
MCA(%)	1,381	39.99	46.45	0.0911	328.4
TVT(%)	1,381	15.23	30.3	0.000778	331.3
TOR(%)	1,381	35.81	57.23	0.0141	556.9

3.2 Correlation analysis

The correlation analysis results between variables are shown in Table 2 . The table 2 tells us that there is a significant positive correlation between each of the four variables. The variables with the highest correlation coefficients are TVT and MACP, and TVT and TRT. The variable TOR has the largest correlation coefficient with the explained variable GDPgth, followed by TVT.

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Table 2: Pairwise correlations.

Variables	GDPgth	MCAP	TVT	TOR
GDPght	1			
MCAP	0.073***	1		
TVT	0.112***	0.582***	1	
TOR	0.144***	0.073***	0.603***	1
Note: *, * *, * * * are significant at the levels of 10%, 5%, and 1%, respectively.				

3.3 Regression analysis

3.3.1 Plane A: Full sample

Table 3 displaies the results of various indicators and economic growth under the full sample. Column (1) is the regression result of model 1, column (2) of model 2, column (3) of model 3, and column (4) of model 4. According to the regression results, the impact of various variables obout the stock market on economic growth can be compared. The regression coefficient of the market capitalization rate (MCAP) in column (1) of Table 3 is 0.0058, which is significant at the 1% level, reveals that the market capitalization rate has a significant positive correlation with economic growth; in column (2) , The coefficient of the turnover rate (TOR) is 0.0093, which is significant at the level of 1%, reveals that the stock market turnover rate and economic growth have a significant positive correlation; the regression coefficient of the transaction ratio (TVT) in column (3) is 0.0137, Significant at the 1% significance level, reveals that the stock market turnover rate has a significant positive correlation with economic growth; column (4) is the result of multiple regression modeling with three indicators of stock market quality. The regression results tell us that except for the changes in the transaction ratio (TVT), the other two indicators are not much different from the previous unary regression results. The reason may be that there is multicollinearity between the three indicators that measure the development of the stock market. This is a comparison between convenience and scatter plots. There is no necessary control variable added here. The regression results in Table 3 show that the three variables that quantify the quality of the stock market deed have certain affects on economic growth. Although the coefficient of determination is small, the F value is relatively large, indicating that although the fitting effect is not good, the model itself is significant.

Table 3: Plane A: full sample of 60 countries.

	dependent variable:GDPght			
	Model 1	Model 2	Model 3	Model 4
_cons	3.9154*** (29.81)	3.8147*** (32.74)	3.9400*** (35.50)	3.5962*** (23.80)
MCAP	0.0058*** (2.72)			0.0061** (2.10)
TOR		0.0093*** (5.40)		0.0099*** (4.15)
TVT			0.0137*** (4.18)	-0.0030*** (-0.55)
N	1381	1381	1381	1381
R^2	0.005	0.02	0.012	0.023
F	7.3835	29.1099	17.4526	11.6743
t statistics in parentheses.* p < 0.,, ** p < 0.05, *** p < 0.01				

3.3.2 Panel B: Regression analysis of 30 middle and high income countries

Table 4 lists the regression analysis results of various indicators and economic growth in 30 high-income countries. Column (1) is the regression of model 1, column (2) of model 2, column (3) of model 3, and column (4) of model 4. The regression coefficient of the market capitalization rate (MCAP) in column (1) of Table 3 is 0.0073, which is significant at the 1% level, indicating that the market capitalization rate will affect economic growth, and this effect is positive; column (2) Among them, the regression coefficient of the turnover rate (TOR) is 0.0066, which is significant at the level of 1%, indicating that the stock market turnover rate will affect economic growth, and this effect is positive; column (3) transaction ratio (TVT), regression coefficient Is 0. 071 at a significant level of 10% indicates that the stock market turnover rate will affect economic growth, and this effect is positive; column (4) is the multiple regression of economic growth on the three indicators that measure the development of the

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stock market. The regression results show that, except for the changes in the transaction ratio (TVT), the other two indicators are not much different from the previous unary regression results. The reason may be that there is multicollinearity between the three variables that measure the quality of the stock market. This is a comparison between convenience and scatter plots. There is no necessary control variable added here. The regression results in Table 3 reveal that variables proposed deed have certain influence on economic growth. Although the coefficient of determination is small, the F value is relatively large, indicating that although the fitting effect is not good, the model itself is significant.

Table 4: Sample of 30 upper-income, upper-middle income countries.

	dependent variable: GDPght			
	Model 1	Model 2	Model 3	Model 4
_cons	3.6583*** (17.98)	3.7822*** (20.44)	3.8843*** (22.60)	3.2391*** (13.06)
MCAP	0.0073*** (2.70)			0.0122*** (3.23)
TOR		0.0066** (2.29)		0.0120*** (2.93)
TVT			0.0077* (1.75)	‘-0.0146* (-1.92)
N	709	709	709	709
R^2	0.009	0.006	0.003	0.018
F	7.2969	5.248	3.0698	5.3261
t statistics in parentheses,* p < 0.1, ** p < 0.05, *** p < 0.01				

3.3.3 Panel C: Regression analysis of 30 low- and middle-income countries

Table 5 lists the regression analysis results of various indicators and economic growth in 30 low-income countries. Column (1) is the regression of model 1, column (2) of model 2, column (3) of model 3, and column (4) of model 4. The regression coefficient of the market capitalization rate (MCAP) in column (1) of Table 3 is 0.005, which is not significant, indicating that the market capitalization rate has basically no effect on economic growth; column (2), the regression of turnover rate (TOR) The coefficient is 0.0114, which is significant at the 1% level, indicating that the stock market turnover rate will affect economic growth, and this effect is positive; in the column (3), the regression coefficient of the transaction ratio (TVT) at the 1% significance level is 0 . 0277, indicating that the stock market turnover rate will affect economic growth, this effect is positive; column (4) is the multiple regression of economic growth on the three indicators to measure the development of the stock market. The regression results show that, except for the market capitalization rate (MCAP), the other two indicators are not much different from the previous unary regression results. The reason may be that there is multiple collinearity among the three indicators that measure the development of the stock market, which is convenient for comparison with scatter plots. Not here. Increase the necessary control variables caused. The regression results in Table 3 reveal that the variables proposed deed have certain influence on economic growth. Although the coefficient of determination is small, the F value is relatively large, indicating that although the fitting effect is not good, the model itself is significant.

Table 5: Sample of 30 lower-income, lower-middle income countries.

	dependent variable:GDPght			
	Model 1	Model 2	Model 3	Model 4
_cons	4.1292*** (23.43)	3.8827*** (26.96)	3.9559*** (28.44)	4.0212*** (20.91)
MCAP	0.0050 (1.21)			-0.0075 (-1.41)
TOR		0.0114*** (5.63)		0.0058** (2.01)
TVT			0.0277*** (5.46)	0.0236*** (2.73)
N	672	672	672	672
R^2	0.001	0.044	0.041	0.052
F	1.4544	31.6522	29.776	13.1916
t statistics in parentheses,* p < 0.1, ** p < 0.05, *** p < 0.01				

This article uses four models to regress on three data sets. The results indicate that the regression

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outcomes of all models across different data sets exhibit a small coefficient of determination but a large F value, suggesting that although the fitting effect is not strong, the model itself is significant.

3.4 Scatter chart analysis

The first set of scatter charts illustrates the relationship between various stock market variables and economic growth under the complete sample. In Figure 1, it is evident that there is a certain correlation between the market capitalization rate and economic growth. The correlation between the two is relatively weak, and there are both positive and negative correlations. In Figure 2, the correlation between stock turnover and economic growth is weak, exhibiting both positive and negative relationships. Figure 3 reveals the weak correlation between the transaction rate and economic growth, again characterized by positive and negative correlations. In contrast, it is observed that among these three graphs, the turnover rate has the greatest relevance to economic growth, while the transaction ratio exhibits the least relevance, corresponding with the smaller coefficient of determination from our previous regression analysis

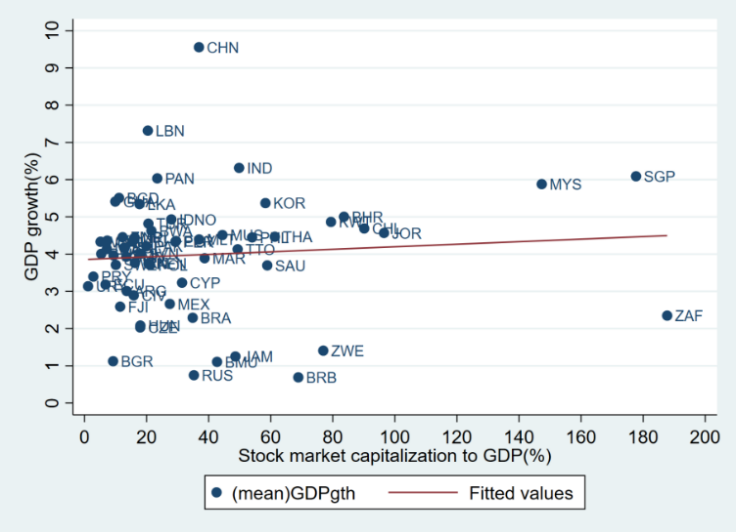

Figure 1: Full sample-the market capitalization rate and economic growth

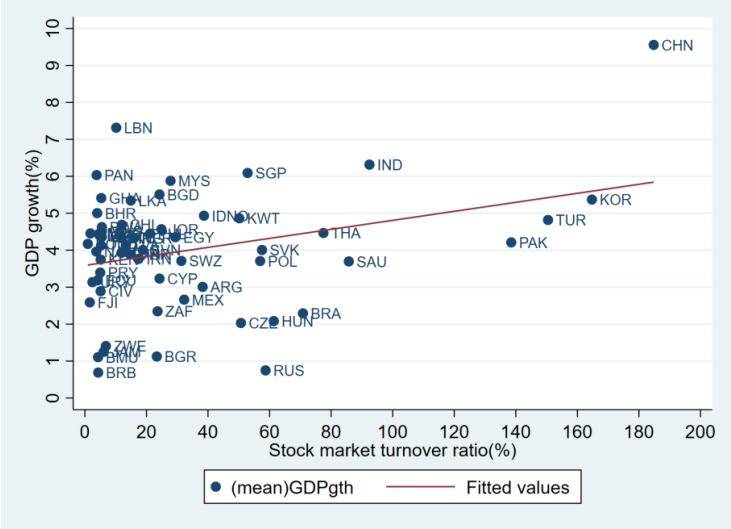

Figure 2: Full sample-the stock turnover and economic growth

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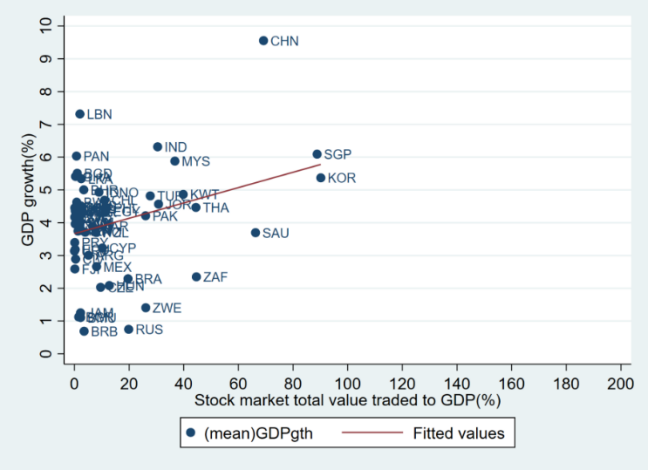

Figure 3: Full sample-the transaction rate and economic growth

The second set of scatter charts examines the relevance between stock market variables and economic growth specifically in high-income countries. Figure 4 indicates that the market capitalization rate is approximately positively correlated with economic growth. In other words, as the market value rate increases, the overall trend of economic growth tends to rise. Figure 5 illustrates that the correlation between stock turnover and economic growth is very weak, and this relationship can be both positive and negative. Figure 6 depicts the connection between stock transaction rates and economic growth, revealing that their correlation is positive or negative, without any obvious overall trend. These findings are consistent with our regression analysis results, highlighting that in high-income countries, the capitalization rate significantly impacts economic growth.

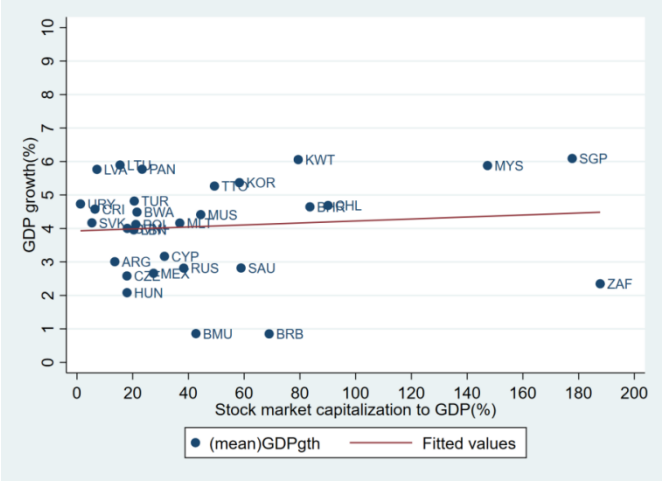

Figure 4: Upper-Income, Upper-Middle income countries-the market capitalization rate and economic growth

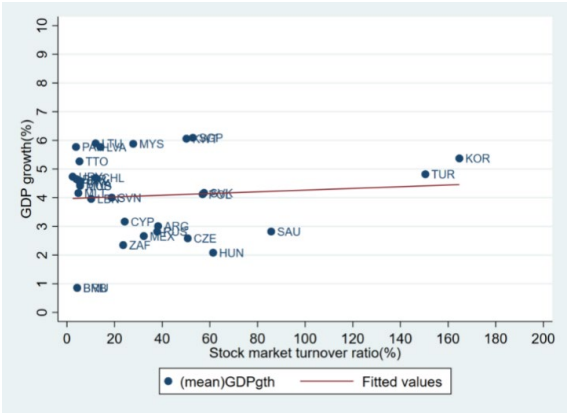

Figure 5: Upper-Income, Upper-Middle income countries-the stock turnover and economic growth

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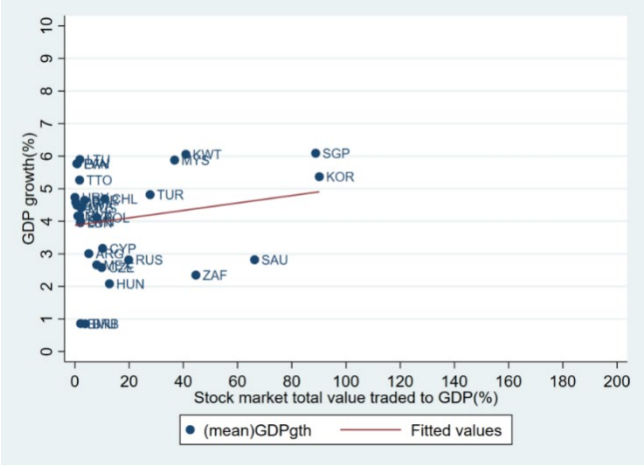

Figure 6: Upper-Income, Upper-Middle income countries-the transaction rate and economic growth

The third set of scatter charts focuses solely on low-income countries. Figure 7 demonstrates that the relevance between capitalization rate and economic growth is weak, with correlations that can be positive or negative, though the details are not very clear. Figure 8 shows that the relationship between turnover rate and economic growth is weak, indicating that the turnover rate has essentially no significant relevance to economic growth. Finally, Figure 9 presents the observation that the transaction ratio has minimal relevance to economic growth. This aligns with our regression results, as the regression coefficient is notably small.

Figure 7: Lower-Income, Lower-Middle income countries-the market capitalization rate and economic growth

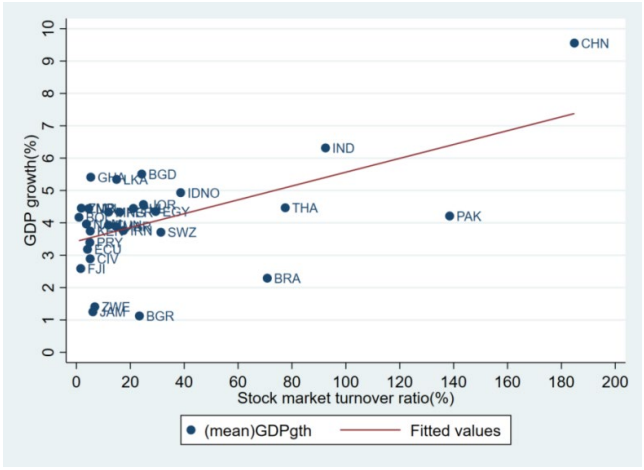

Figure 8: Lower-Income, Lower-Middle income countries-the stock turnover and economic growth

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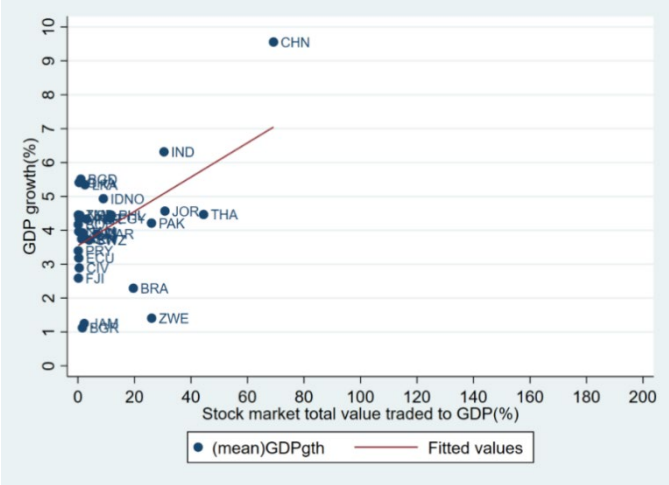

Figure 9: Lower-Income, Lower-Middle income countries-the transaction rate and economic growth

4. Conclusion

Through the above analysis, our main conclusions are as follows:

1) The variables about stock market caculated in this article have positive relavance with the country's economic growth. In different countries, variables have different effects on economic growth.

2) Either in high-income countries or low-income countries, studies have revealed that the stock market is not very relevant with economic growth. However, among these weak correlations, the correlation in high-income economies is slightly higher than that in low-income economies. This result can be confirmed by analyzing the influence mechanism of the stock market on economic growth. On the one hand, the stock market has an impact on the economy by affecting the marginal productivity of capital.

The liquidity of the stock market providing financial support for technological innovation. At the same time, the venture capital mechanism can also help small and medium-sized high-tech enterprises to grow rapidly, thereby promoting the upgrade of the entire industry. Enterprise mergers and acquisitions and reorganizations must meet the following three conditions: clear property rights, sufficient funds and low information acquisition costs. The stock market only provides convenience for enterprises in these three aspects, so it has an internal mechanism to promote the transformation and upgrading of the industrial structure. The stock market can directly affect the company's investment propensity through changes in market prices. This impact includes three aspects. This function also leads to the fact that equity usually dominates other distribution methods. Debt and bank loans have become an auxiliary financing method for equity financing, and equity has become a risk guarantee for debt and bank loans. Liquidity is a basic feature of the stock market, which enables high-risk and long-term investment projects to obtain financing. The stock market can affect society’s willingness to save, thereby changing people’s propensity to consume, causing changes in the investment multiplier, and ultimately leading to changes in total social demand (consumption demand and investment demand). When the size of the stock market expands and the stock price rises, the actual income of residents increases, which directly stimulates consumption. People's expectations for the future will also improve, which will change the individual's marginal propensity to consume. Increasing economic interests of enterprises can boost consumption. At the same time, good stock market liquidity has increased society’s gu piao shi chang, which has directly reduced people’s precautionary savings and lowered the savings rate. All the above-mentioned influence mechanisms require a sound economic system and a mature capital market.

The empirical analysis of this article shows that there is indeed a significant positive correlation between them. However, this interaction is not always good. When the stock market is booming and stock prices continue to rise, the wealth effect of the stock market can stimulate consumption, boost investors' investment confidence, and promote social and economic development. But , if the stock market is sluggish, the negative wealth effect will further reduce people's willingness to consume and reduce social capital's expectations for the future, thereby reducing the vitality of social and economic development and hindering economic growth. Fully understanding and making good use of the interaction between the stock market and the macro economy can add means to our macroeconomic

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regulation and control so that the finance and economy can reinforce each other.

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Appendix

No	Country	Code	income Group
1	Bangladesh	BGD	Low income
2	Bulgaria	BGR	Lower middle income
3	Bolivia	BOL	Lower middle income
4	Brazil	BRA	Lower middle income
5	China	CHN	Lower middle income
6	Cote d'Ivoire	CIV	Low income
7	Ecuador	ECU	Lower middle income
8	Egypt, Arab Rep.	EGY	Lower middle income
9	Fiji	FJI	Lower middle income
10	Ghana	GHA	Low income
11	Indonesia	IDNO	Lower middle income
12	India	IND	Low income
13	Iran, Islamic Rep.	IRN	Lower middle income
14	Jamaica	JAM	Lower middle income
15	Jordan	JOR	Lower middle income
16	Kenya	KEN	Low income
17	Sri Lanka	LKA	Lower middle income
18	Morocco	MAR	Lower middle income
19	Mongolia	MNG	Low income
20	Namibia	NAM	Lower middle income
21	Nepal	NPL	Low income
22	Pakistan	PAK	Low income
23	Peru	PER	Lower middle income
24	Philippines	PHL	Lower middle income
25	Paraguay	PRY	Lower middle income
26	Swaziland	SWZ	Lower middle income
27	Thailand	THA	Lower middle income
28	Tunisia	TUN	Lower middle income
29	Zambia	ZMB	Low income

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30	Zimbabwe	ZWE	Low income
31	Argentina	ARG	Upper middle income
32	Bahrain	BHR	High income: nonOECD
33	Bermuda	BMU	High income: nonOECD
34	Barbados	BRB	Upper middle income
35	Botswana	BWA	Upper middle income
36	Chile	CHL	Upper middle income
37	Costa Rica	CRI	Upper middle income
38	Cyprus	CYP	High income: nonOECD
39	Czech Republic	CZE	Upper middle income
40	Hungary	HUN	Upper middle income
41	Korea, Rep.	KOR	High income: OECD
42	Kuwait	KWT	High income: nonOECD
43	Lebanon	LBN	Upper middle income
44	Lithuania	LTU	Upper middle income
45	Latvia	LVA	Upper middle income
46	Mexico	MEX	Upper middle income
47	Malta	MLT	High income: nonOECD
48	Mauritius	MUS	Upper middle income
49	Malaysia	MYS	Upper middle income
50	Panama	PAN	Upper middle income
51	Poland	POL	Upper middle income
52	Russian Federation	RUS	Upper middle income
53	Saudi Arabia	SAU	High income: nonOECD
54	Singapore	SGP	High income: nonOECD
55	Slovak Republic	SVK	Upper middle income
56	Slovenia	SVN	High income: nonOECD
57	Trinidad and Tobago	TTO	Upper middle income
58	Turkey	TUR	Upper middle income
59	Uruguay	URY	Upper middle income
60	South Africa	ZAF	Upper middle income