

Analysis of Macro-influencing Factors of Stock Price Index

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Abstract— As an important part of the financial market, the stock market is a leading indicator of macroeconomics. Changes in stock prices and trends are the focus of much attention in the capital market. Changes in macroeconomic factors have a great impact on the stability of the stock market and investors' investment strategies. In order to explore the main macroeconomic factors affecting the stock price index, the Shanghai Stock Index is used as the dependent variable in this paper. Ten representative macroeconomic indicators are selected. Firstly, make a correlation analysis between these indicators and the Shanghai Stock Exchange Index to screen out significantly related indicators; Secondly, use the SPSS software to perform multiple linear regression on the screened indicators and establish a regression model to obtain the main macroeconomic factors affecting the stock price index; Finally, corresponding policy recommendations are given for the macroeconomic factors affecting the stock price index.

Keywords— Stock price index; Macro influence factors; Multiple linear regression model.

I. INTRODUCTION

As an important part of the financial market, the stock market not only undertakes the functions of capital intermediaries for financing and resource allocation, but also can predict macroeconomics through its performance^[1]. The stock price index is a reference indicator prepared by a stock exchange or financial service institution to indicate changes in the stock market. It is an index describing the change in the total price level of the stock market. The stock price index is a relative indicator that dynamically reflects the total price level of the stock market in a certain period, and is also an important indicator for evaluating the development of the stock market. The operation of the macro economy determines the long-term trend of the securities market. Macroeconomic factors are also one of the important factors affecting the long-term trend of the securities market^[2].

In the actual economic operation, the factors affecting the stock index are very complicated. Although there are many unpredictable factors in real life, and statistical models cannot predict the decline or increase of indicators with 100% accuracy, it can provide a basic forecasting trend^[3]. If the quantitative analysis of the model and the qualitative analysis of the market can be combined, it will definitely make people have a more accurate understanding of the current and future stock market conditions. This will not only help stockholders better analyze the stock market to make relatively informed decisions, It can also help solve the problems in the operation of the national economy and make China's economy develop better [4]. In this paper, ten representative macroeconomic indicators are selected for correlation analysis and regression analysis. Macro factors that do not have significant correlation are eliminated, and macro influence factors that have a greater impact on China's stock price index are obtained.

II. SETTING OF MACRO-INFLUENCING FACTORS OF STOCK PRICE INDEX

2.1 Determination of Influencing Factor Indicators

The Shanghai Stock Exchange Index reflects the changes in the prices of listed securities in general and from different aspects. Taking the prices of all listed stocks as a sample, it has a broader representation and can reflect the situation of the entire stock market^[5]. The Shanghai Composite Index was used as the dependent variable. In view of the fact that the Shanghai Stock Exchange Index can reflect the prosperity of different industries and the overall price changes^[6], and the Shanghai Stock Price Index has a strong correlation with the Shenzhen Stock Price Index, the trends of the KLCI of the two cities are very similar. As an explanatory variable, the Shenzhen Securities Index is no longer analyzed similarly.

2.2 Determination of Macro Factors Affecting Stock Index

(1) Affect the choice of Shanghai Stock Index. This article selects ten economic variables that are relatively representative from many macro factors that affect the stock price index: national foreign exchange reserve (X1); exchange rate (X2); interest rate (baseline interest rate for deposits) (X3); reserve ratio(X4); Consumer Confidence Index (X5); Corporate Commodity Price Index (X6); Macroeconomic Prosperity Index (X7); Money Supply (X8); Shanghai Stock Exchange Total Market Value (X9); Urban Fixed Asset Investment (X10).

(2) Collection and arrangement of sample data. The sample data used in this article are derived from relevant monthly statistical data of the National Bureau of Statistics of the People's Republic of China, the People's Bank of China, the Shanghai Stock Exchange, and the China Securities Regulatory Commission.

III. THE WORKING PRINCIPLE OF RELATED MACRO FACTORS AFFECTING STOCK PRICE INDEX

3.1 National Foreign Exchange Reserve

The increase in national foreign exchange reserves will increase imports to a certain extent, and the government will adopt a more correct repurchase policy to buy back bonds, so that people will have more idle funds. The entry of idle funds into the stock market will lead to an increase in stock market

funds. The inflow of funds from the stock market will cause the stock market price to rise. The reduction of national foreign exchange reserves will reduce the import or repurchase of bonds to a certain extent, so that people will have less idle funds, which will lead to a decrease in stock market funds and ultimately a decline in stock market prices^[7].

3.2 Exchange Rate

As the trend of world economic integration is gradually increasing, the influence of financial markets in various countries, including securities markets, will deepen each other, and fluctuations in a country's exchange rate will also affect its securities market prices. In theory, the appreciation of a country's currency will attract foreign capital inflows, the so-called "hot money", and the prosperity of the stock market will cause the stock price to rise^[8]; Conversely, the large escape of "hot money" will devalue the currency and the stock price will fall accordingly. However, if the exchange rate rises blindly, it will also have an adverse impact on the stock market, because a too high exchange rate will affect trade exports, hinder exports, and be detrimental to economic development, which will affect the securities market.

3.3 Interest Rate

Generally speaking, when interest rates rise, savings appear more attractive, and people's willingness to save rises. Therefore, attracting some funds from the stock market to banks to save, resulting in a decline in demand for stocks and a decline in stock price index. However, in the medium and long term, the rise and fall of interest rates and the rise and fall of stock prices are not simply negative correlations. This is because stock prices are not only affected by interest rates, but are affected by multiple factors, not a single factor. Can decide.

3.4 Deposit Reserve Ratio

Deposit reserves are prepared by financial institutions to ensure that customers withdraw their deposits and fund clearing needs. They are deposits with central banks. When the central bank increases the statutory reserve ratio, the ability of commercial banks to provide loans and create credit will decline. As a result, the society's monetary system is tighter, the money supply is reduced, the interest rate is increased, and investment and social expenditure will be reduced accordingly^[9].

3.5 Consumer Confidence Index

The Consumer Confidence Index is an indicator that reflects the strength of consumer confidence. It is a comprehensive reflection and quantification of the consumer's subjective feelings about the current economic situation and the economic prospects, income levels, income expectations and consumer psychological state. It is a forecast of economic trends and consumption. A leading indicator of trends. Consumer confidence index is positively correlated with stock price index.

3.6 Corporate Commodity Price Index

The commodity price index of enterprises reflects the trend of price changes of domestic commodity centralized

transactions. The commodity price index of a company has a negative correlation with the stock price. A rise in this index represents an increase in the cost of purchasing raw materials and labor services, a decline in corporate profit margins, and a deterioration in financial conditions, leading to a decline in the stock price index; otherwise, the company's operating conditions improve, Stock quality, stock price index rose.

3.7 Macroeconomic Climate Index

The macroeconomic prosperity index has a positive correlation with stock prices. The higher the economic prosperity index and the faster the economic development, the sufficient the money supply will cause some funds to flow into the stock market, and the increase in the demand for stocks will increase the stock price; otherwise, the economic prosperity index will decrease, the economic development will slow, the money supply will decrease, and the stock Demand has fallen and stock prices have fallen.

3.8 Currency Supply

The increase in money supply can increase the demand for stocks and promote the prosperity of the stock market.

3.9 Total Market Value of Shanghai Stock Exchange

The total value of the stock market's own market value will increase the possibility of the stock market's stock price rising. At the same time, the value of the stock market is also an important support for stock price fluctuations. In theory, the total market value of the Shanghai Stock Exchange and the Shanghai Stock Exchange Index show a strong positive correlation. When the total market value of the Shanghai Stock Exchange rises, the Shanghai Stock Index will also show an upward trend.

3.10 Urban Fixed Asset Investment

Investment in fixed assets is the main means for the re-growth of social fixed assets. Investment in fixed assets should have stimulated China's economic growth. However, through the correlation analysis, it is found that there is a negative correlation between urban fixed asset investment and the Shanghai Stock Exchange Index. This abnormal economic phenomenon shows that the misalignment of China's economic investment structure in recent years has caused problems of excess capacity and investment waste.

IV. EMPIRICAL ANALYSIS OF MACRO INFLUENCING FACTORS OF STOCK INDEX

4.1 Correlation Analysis between Macroeconomic Indicators and Shanghai Stock Index

The SPSS software was run on the original data, and the selected macroeconomic indicators were correlated with the Shanghai Stock Index. Correlation analysis results are arranged in order of significance as shown in Table 1.

According to the correlation analysis table, the sig value of the consumer confidence index X5 is 0.076, which is greater than 0.05, which indicates that the consumer confidence index and the Shanghai Stock Exchange Index are not significantly related at the level of 0.05, so the independent variable X5 is excluded. Then analyze the consumer confidence index X5.

4.2 Building a Multiple Linear Regression Model

This article attempts to build a regression model of the Shanghai Stock Index and various macro influence factors based on the existing data, and analyzes and tests the model with SPSS software. Build the following model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \mu$$

Among them, Y: Shanghai Stock Exchange Index; X1: National Foreign Exchange Reserve; X2: Exchange Rate; X3: Interest Rate; X4: Deposit Reserve Ratio; X5: Consumer Confidence Index; X6: Corporate Commodity Price Index; X7: Macroeconomic Prosperity Index; X8: Money supply; X9: total market value of the Shanghai Stock Exchange; X10: urban fixed asset investment; μ : other influencing factors.

TABLE 1. SPSS correlation analysis

S. No.		Shanghai Stock Exchange Index Y
Macroeconomic Prosperity Index X7	Pearson correlation	.864**
	Significant (two-tailed)	.000
Money supply X8	Pearson correlation	-.824**
	Significant (two-tailed)	.000
Corporate Commodity Price Index X6	Pearson correlation	.808**
	Significant (two-tailed)	.000
Total market value of the Shanghai Stock Exchange (100 million yuan) X9	Pearson correlation	.806**
	Significant (two-tailed)	.000
Exchange Rate X2	Pearson correlation	.769**
	Significant (two-tailed)	.000
urban fixed asset investment (100 million yuan) X10	Pearson correlation	-.724**
	Significant (two-tailed)	.000
National foreign exchange reserves (US \$ billion) X1	Pearson correlation	-.667**
	Significant (two-tailed)	.000
Deposit Reserve Ratio X4	Pearson correlation	-.595**
	Significant (two-tailed)	.000
Interest Rate X3	Pearson correlation	-.513**
	Significant (two-tailed)	.001
Consumer Confidence Index X5	Pearson correlation	.288
	Significant (two-tailed)	.076

** . At a confidence level (double test) of 0.01, the correlation is significant.

Data source: SPSS software processing and collation according to the collected data.

4.3 Stepwise Regression Analysis

First use the explanatory variables to perform simple regression on each of the explanatory variables considered, then based on the regression equation corresponding to the explanatory variable that contributes the most to the explanatory variables, and then gradually introduce the remaining explanatory variables. After stepwise regression, the explanatory variables that remain in the model at the end

are both important and without multicollinearity.

Because there is a certain degree of correlation between some macroeconomic indicators, in order to reduce the multicollinearity of the running results of the regression model, this paper uses stepwise regression analysis on the remaining nine independent and dependent variables, and performs colinearity diagnosis to The analysis results are more accurate.

After SPSS stepwise regression analysis, these equations are unavailable due to the existence of explanatory variables with insignificant regression coefficients in the first two models and strong collinearity between the explanatory variables. The third model is the final equation. The probability P value of the significance test of the regression coefficient is less than the significance level and the VIF (Variance Expansion Factor) values of the colinearity statistics are all less than 10. It is less likely to have multicollinearity. The third model retains the deposit reserve ratio X4, the macroeconomic prosperity index X7, and the total market value of the Shanghai Stock Exchange X9.

The SPSS results of stepwise regression analysis of the Shanghai Stock Exchange Index Model are shown in Tables 2, 3 and 4.

4.4 Testing Multiple Linear Regression Models

SPSS software was used to perform multiple linear regression analysis on the explanatory variables X4, X7, X9 and the explanatory variables of the Shanghai Stock Exchange Index retained in Model 3. The running results are shown in Tables 5 to 8.

TABLE 2. Stepwise regression analysis entered / removed variables

Variables entered / removed			
Model	Variable entered	Variable removed	Method
1	Macroeconomic Prosperity Index X7	.	Stepping (Criterion: F-to-enter Probability <= .050, F-to-remove Probability >= .100)
2	Total market value of the Shanghai Stock Exchange (100 million yuan) X9	.	Stepping (Criterion: F-to-enter Probability <= .050, F-to-remove Probability >= .100)
3	Deposit Reserve Ratio X4	.	步进 (准则: F-to-enter 的概率 <= .050, F-to-remove 的概率 >= .100)。

a. Dependent variable: Shanghai Stock Index

TABLE 3. Summary of stepwise regression analysis models

Model summary ^d										
Model	R	R ²	R ² adjusted	Standard estimation error	Change statistics					Durbin-Watson(U)
					R ² changed	F change	df1	df2	Significant F change	
1	.864 ^a	.746	.739	169.60496	.746	97.166	1	33	.000	
2	.931 ^b	.867	.859	124.76511	.120	28.982	1	32	.000	
3	.970 ^c	.940	.934	85.10076	.073	37.781	1	31	.000	2.281

a. Predictors: (constant), Macroeconomic Climate Index X7
b. Predictors: (constant), Macroeconomic Prosperity Index X7, Shanghai Stock Exchange Market Value (100 million yuan) X9
c. Predictors: (Constant), Macroeconomic Prosperity Index X7, SSE Stock Market Value (100 million yuan) X9, Deposit Reserve Ratio X4
d. Dependent variable: Shanghai Stock Index

TABLE 4. Model 3 deleted variables

Excluded variables ^a								
Model	Enter β	t	Saliency	Partial correlation	Collinear statistics			
					allow	VIF	Minimum tolerance	
3	National foreign exchange reserve (100 million US dollars) X1	.228 ^d	1.274	.213	.227	.059	16.829	.059
	Exchange Rate X2	-.267 ^d	-1.154	.258	-.206	.036	27.928	.036
	Interest Rate X3	.265 ^d	1.370	.181	.243	.050	19.951	.050
	Corporate Commodity Price Index X6	-.011 ^d	-.061	.952	-.011	.062	16.141	.060
	Money supply X8	-.074 ^d	-.467	.644	-.085	.079	12.666	.079
	urban fixed asset investmen(100 million yuan)X10	-.092 ^d	-1.407	.170	-.249	.441	2.267	.414

The available regression models are:

$$Y = -3208.398 - 5891.487 X4 + 49.935 X7 + 0.011 X9$$

The results of the regression model show that the deposit reserve ratio is negatively correlated with the Shanghai Stock Exchange Index, and the macroeconomic prosperity index and the total market price of the Shanghai Stock Exchange are positively correlated with the Shanghai Stock Exchange Index. Statistical test:

1. Goodness-of-fit test. From the results in the table above, we know that $R^2 = 0.937$ and adjusted R^2 is 0.932, which is a large value, indicating that the estimated sample regression equation fits the sample observations better, and the model has a higher degree of good fitting, The actual situation is

relatively consistent, which can better reflect the impact of various economic factors on the Shanghai Stock Index.

2. T test. The significance level in the text is 0.05, and the degree of freedom of t is 35. It can be known from the table that the quantile on both sides of the t distribution is 1.69. The coefficients of all factors in the text pass the t test, and the sig value approaches 0, which is lower than the general significance Sexual level, indicating that they have a significant effect on the Shanghai Stock Exchange Index.

3. F test. The F value of the entire regression model equation was 174.246, and the estimated regression model passed the F test, indicating that the equation has a significant explanatory effect on the Shanghai Composite Index.

TABLE 5. Regression coefficients under three explanatory variables

Coefficient ^a											
Model	Non-standardized coefficient		Standard coefficient	t	Significant	Correlation			Collinear statistics		
	B	Standard error	β			Zero order	Branch	component	allow	VIF	
3	(constant)	-3208.398	855.043		-3.752	.001					
	Deposit Reserve Ratio X4	-5891.487	910.888	-.326	-6.468	.000	-.595	-.738	-.274	.706	1.417
	Macroeconomic Prosperity Index X7	49.935	8.533	.374	5.852	.000	.864	.703	.248	.439	2.277
	Total market value of the Shanghai Stock Exchange (100 million yuan) X9	.011	.001	.521	9.318	.000	.806	.844	.395	.573	1.744

a. Dependent variable: Shanghai Stock Index

TABLE 6. Coefficient correlation

Correlation					
		The Shanghai Composite Index	Deposit Reserve Ratio X4	Macroeconomic Prosperity Index X7	Total market value of the Shanghai Stock Exchange X9
Pearson correlation	The Shanghai Composite Index	1.000	-.595	.864	.806
	Deposit Reserve Ratio X4	-.595	1.000	-.503	-.156
	Macroeconomic Prosperity Index X7	.864	-.503	1.000	.627
	Total market value of the Shanghai Stock Exchange X9	.806	-.156	.627	1.000
Saliency (single-tailed)	The Shanghai Composite Index	.	.000	.000	.000
	Deposit Reserve Ratio X4	.000	.	.001	.171
	Macroeconomic Prosperity Index X7	.000	.001	.	.000
	Total market value of the Shanghai Stock Exchange X9	.000	.171	.000	.
digital	The Shanghai Composite Index	39	39	39	39
	Deposit Reserve Ratio X4	39	39	39	39
	Macroeconomic Prosperity Index X7	39	39	39	39
	Total market value of the Shanghai Stock Exchange X9	39	39	39	39

TABLE 7. Variance analysis

ANOVA ^a						
Model	Sum of square	Degrees of freedom	Mean square	F	Saliency	
3	return	4037470.550	3	1345823.517	174.246	.000 ^b
	Residual	270329.639	35	7723.704		
	total	4307800.190	38			

a. Dependent variable: Shanghai Stock Index
b. Predictor: (constant),X9, X4, X7

TABLE 8. Model summary

Model	R	R ²	R ² adjusted	Standard estimation error	Change statistics					Durbin-Watson(U)
					R ² changed	F change	df1	df2	Significant F change	
3	.968 ^a	.937	.932	87.88461	.937	174.246	3	35	.000	2.247
a. Predictor: (constant), X9, X4, X7										
b. Dependent variable: Shanghai Stock Index										

4.5 Model Economic Significance Analysis

The coefficients of the macroeconomic prosperity index and the total market value of the Shanghai Stock Exchange are positive, indicating that they are in the same direction as the Shanghai Composite Index. In the Shanghai Stock Exchange, specifically, when the total market value of the Shanghai Stock Exchange increases by one unit, the Shanghai Stock Index increases by 0.011 percentage point; when the macroeconomic prosperity index increases by one unit, the Shanghai Stock Index increases by 49.935 percentage points. The deposit reserve ratio coefficient is negative, indicating that it is negatively correlated with the Shanghai Stock Exchange Index. Specifically, when the deposit reserve ratio increases by 1 unit, the Shanghai Stock Exchange Index decreases by 5891.487 percentage points.

V. COUNTERMEASURES FOR THE HEALTHY DEVELOPMENT OF THE STOCK MARKET

According to the theoretical and empirical analysis of this article, we can know that the macro factors affecting China's stock prices include: deposit reserve ratio, macroeconomic prosperity index, and the total market value of the Shanghai Stock Exchange. In fact, there are still many macro factors that affect stock prices, such as GDP, economic cycles, international trade balances, etc. Stock prices are the result of a combination of factors. The stable and rapid development of the stock market has a positive effect on the economy. In order to maintain economic development and financial market stability, state agencies and financial departments need to actively guide and formulate active and effective policies and regulations to promote economic development and maintain market stability. Based on the above discussion, this article makes the following suggestions:

5.1 Enhancing the Vitality of Enterprise Innovation and Finding New Economic Growth Points

Improving the ability of enterprises to innovate independently, and establishing an enterprise-oriented, market-oriented, technology-innovation system that combines production, education, and research are fundamental ways for enterprises to survive, develop, and improve their overall competitiveness. To accelerate technological innovation projects, comprehensive use of policies and investment Diversified support methods such as financial services, services, etc., guide various types of innovation elements to gather in enterprises, make enterprises truly become the main body of research and development investment, the main body of technological innovation activities, create new economic growth points, and maintain stable economic development.

5.2 Deepen Financial System Reform and Improve Financial Supervision System

The financial system is an important part of the socialist market economic system. Deepen the reform of the financial system, strengthen the ability of financial services to the real economy, increase the proportion of direct financing, and promote the healthy development of multi-level capital markets. At present, the financial system is becoming increasingly complex and the financial market is becoming more and more open, and many risks and challenges have followed. Therefore, while deepening the reform of the financial system, it is also important to strengthen financial supervision. The current world economic environment is changing, the domestic economic situation is complex, and the financial industry cannot be opened too quickly. It needs to be promoted in an orderly and steady manner. At the same time, it is necessary to strengthen the monitoring, analysis and early warning of cross-border capital flows, improve the foreign exchange management system, and prevent cross-border capital the impact of the changes on China's economic and financial stability^[10].

5.3 Further Accelerate the Marketization of Exchange Rates and Interest Rates

The market-oriented reform of interest rates and exchange rates is the most important reform in the financial sector. It is necessary to promote the marketization of exchange rates and interest rates so that the market plays a decisive role in the formation and change of RMB interest rates, and further increase the flexibility of the RMB exchange rate^[11]. Strengthen the characteristics of China's response to the turbulent and rapidly changing financial market.

5.4 Use of Appropriate Monetary Policy Tools

The impact of monetary policy on stock market price fluctuations is also reflected through the money supply. When the money supply increases and adapts to production and circulation, it will promote the economic boom. At this time, the listed company's production scale will increase, sales income will increase, and its profitability will increase significantly. The stock price will also rise accordingly. When there is an abnormal phenomenon in economic development and inflation is looming, in order to prevent economic deterioration and maintain normal economic development, the central bank must tighten money and reduce the money supply by issuing government bonds and adjusting interest rates, resulting in weakening market purchasing power, which affects the stock price rose^[12]. Therefore, the central bank must maintain an appropriate supply of money, ensure the rational operation of the economy, and promote the healthy and healthy development of China's stock market.

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