Impact Analysis of Macroeconomic Factors on Stock Value of Shanghai Pudong Development Bank under PCA Regression

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Abstract

When we consider the factors affecting the stock market, we often consider the impact of macroeconomic factors on it. On the basis of the academic achievements of predecessor scholars on macroscopic factors affecting the overall stocks, this article selects six macroeconomic influencing factors: money supply, USDCNY exchange rate, GDP, national fiscal revenue, price index and interest rate, and uses PAC regression analysis method to construct a regression model. Analyze the influencing factors of Shanghai Pudong Development Bank stock; then conduct heteroscedasticity, autocorrelation, and multicollinearity tests to modify and adjust the regression model; finally, make relevant recommendations based on the analysis results.

Keywords: Stock Value; PAC Regression; Macroeconomic Factors; Multicollinearity; Shanghai Pudong Development Bank Stock

1 INTRODUCTION

The stock market is very important to the future development of our country. Mr. Sun Jiaying, the author of Valuation Logic, believes that the stock market is a pure stock market, and its rise and fall are a mathematical symbol of the exchange of funds and chips for the whole society, and it acts as a resident in the society. The accumulator of wealth and the accelerator of wealth distribution. At present, there are many articles and studies on the impact of macroeconomic factors on the stock market. Based on previous studies, this article analyzes the impact of macroeconomic factors on the stock price of Shanghai Pudong Development Bank.

In essence, stocks are just a kind of certificate, whose function is to prove the holder's property rights, and does not contain use value like ordinary commodities, so stocks themselves have no value and cannot have a price. However, after holding stocks, shareholders can not only participate in the general meeting of shareholders to exert influence on the operating decisions of the joint-stock company, but also enjoy the right to dividends and dividends, and obtain corresponding economic benefits. Therefore, stocks are also a kind of virtual capital. It can be transferred into the market as a special commodity. The value of stocks is to measure the value of stocks as a means of profit in the form of currency.

The head office of Shanghai Pudong Development Bank is located in Shanghai. It was established on August 28, 1992 with the approval of the People's Bank of China. It is a national joint-stock commercial bank. At the end of December 2017, the company's total assets reached 6.14 trillion yuan, and the total share capital reached 29,352,080,400 shares. Since its listing, Shanghai Pudong Development Bank has been rated as one of the "Top 100 Listed Companies in China" by Asia Weekly for many consecutive years, and Shanghai Pudong Development Bank ranked 49th in the "2016 Top 500 Chinese Enterprises". The research on classic bank stocks such as Shanghai Pudong Development Bank stocks is universal, which is conducive to the stability of the future stock market.

2 MODEL ESTABLISHMENT

2.1 Variables and Data

This paper uses spss and Eviews software to construct a multiple regression model to analyze the impact of various macroeconomic factors on the stock value of Shanghai Pudong Development Bank. The explanatory variable in this article is the total annual operating income of stocks (indicated by Y), and the explanatory variable is China's money supply (indicated by X1), USDCNY exchange rate (indicated by X2), GDP (indicated by X3), national fiscal expenditure (indicated by X4), and prices Index (X5) and interest rate (X6) are six macroeconomic factors. The data comes from the annual data of the National Data Network from 2010 to 2019, and the public data of Oriental Fortune.com and Zhongcai.com.

2.1.1 The Explained Variable

The explanatory variable in this article is the total annual operating income of Shanghai Pudong Development Bank stocks. Valuation in stock investment has always been a problem. How to make a more scientific and reasonable valuation has always been pursued by many investors. In the field of stock investment, the stock god Buffett undoubtedly has very superb investment skills and important influence. He believes that the total annual operating income of stocks is the source of the company's profitability and its growth reflects the investment value of the company's stocks. Simply put, it means that the survival management of a company should be clear and clear. The past data on the financial statements (depending on the past three years) represents the company's operation and management.

2.1.2 Explaining Variables

(1) My country's money supply

Money supply, also known as money stock and money supply, refers to the sum of cash and deposits in circulation at a certain point in time. Money supply is an important indicator for financial authorities to intervene in economic development through the financial market. It is divided into different levels according to the strength of currency liquidity, namely M0, M1, M2, M3, M4, etc.

(2) USDCNY exchange rate

Exchange rate refers to the ratio or ratio of one country's currency to another country's currency, or the price of another country's currency expressed in one country's currency. Exchange rate changes have a direct regulatory effect on a country's import and export trade. Under certain conditions, by devaluing the domestic currency, that is, letting the exchange rate fall, will promote exports and restrict imports; conversely, the foreign appreciation of the domestic currency, that is, an increase in the exchange rate, will play a role in restricting exports and increasing imports. The exchange rate is a financial means used by various countries to achieve their political goals.

Exchange rates will change due to interest rates, inflation, national politics, and each country's economy. The exchange rate is determined by the foreign exchange market. The exchange rate of USDCNY, namely "U.S. Dollar and RMB", this article selects the exchange rate data of USD to RMB from 2010 to 2019 [1].

(3) GDP

Gross domestic product (GDP) refers to the final outcome of all resident units in a country (or region) during a certain period of time calculated at national market prices, and is often recognized as the best indicator of the country's economic conditions. The higher the macroscopic GPD growth rate, the better the performance of listed companies, that is, the higher the earnings per share and the return on net assets, and the more listed companies have investment value.

(4) State fiscal expenditure

Fiscal revenue refers to the sum of all funds raised by the government to perform its functions, implement public policies, and provide public goods and services. According to reports, in the first five months of 2010, China's fiscal revenue was 3.5470 billion yuan, an increase of 836.2 billion yuan or 30.8% over the same period last year.

Combined with the expectation in the second half of the year, the entire year may reach 8 trillion yuan, which means that the Chinese government will become the second richest government in the world.

(5) Price index

The price index is an index that measures changes in the overall level of prices in the market. An increase in the overall price level means that inflation has occurred. On the contrary, a decrease in the overall price level means deflation. The price index is used to measure the inflation or deflation in the economy.

If the price index rises too high, it indicates that inflation has become a factor affecting social and economic instability, and the central bank will have monetary tightening policies and related fiscal policies promulgated, which will have a certain impact on social and economic development. Therefore, the increase in the index often has an impact on the economy. The price index is a macroeconomic indicator that can express an economy.

(6) Interest rate

Interest rate refers to the ratio of the amount of interest to the amount of borrowed funds (principal) in a certain period of time. Interest rate is the main factor that determines the level of capital cost of a company, and it is also a decisive factor for corporate financing and investment. Research on the financial environment must pay attention to the current interest rate and its changing trend [2].

Interest rates ultimately affect the stock market through two aspects: corporate financing costs and the amount of market funds.

2.1.3 Model Setting

The model is set as:

$$Y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \beta_5 x_{5i} + \beta_6 x_{6i} + \varepsilon_i$$

Among them, Y_i is the value of the explained variable, x_{1i} is the value of the explanatory variable, β_0 is the parameter of the sample regression function, and ε_i is the random error.

3 EMPIRICAL ANALYSIS

3.1 Sample Selection

This article takes Shanghai Pudong Development Bank as the research object, and uses the above six macroeconomic factors as research data during the ten years from 2010 to 2019. The data comes from the market data of Shanghai Pudong Development Bank of China Finance Network, the national data released by the National Bureau of Statistics, and the financial report and K-line chart of Oriental Fortune Network.

3.2 Model Estimation

The PAC-regression analysis method (principal component regression analysis method) is used to estimate the model parameters to achieve the effect of dimensionality reduction and construct a new regression model. The estimation process is as follows:

(1) Use spss software to perform principal component regression analysis to find the eigenvalues, calculate the eigenvectors, and extract the principal components;

(2) Use Eviews tools and use OLS estimation to establish a new regression model;

(3) Perform heteroscedasticity, autocorrelation, and multicollinearity tests on the regression model;

(4) Modify and improve based on the above inspection results;

(5) Finally, the principal component function is substituted into the regression equation that has passed the test, and compared with the economic significance for descriptive statistical analysis.

3.3 Model Testing

3.3.1 Extract the Principal Components

KMO 和巴特利特检验ᵃ

KMO 取样适切性量数。		.676
巴特利特球形度检验	近似卡方	127.627
	自由度	15
	显著性	.000

a. 基于相关性

FIGURE 1 KMO AND BARTLETT TEST

Since the KMO sampling appropriateness measure=0.676>0.5, there is a correlation between the variables; because the Bartlett sphericity test (significance) = 0.000<0.005, the sample data can be factored. Using the above six explanatory variables cannot accurately describe the impact on the value of Shanghai Pudong Development Bank's stocks, and principal component regression analysis is required.

According to the spss analysis results, two principal components F1 and F2 are extracted. Divide the column values of the "component matrix" by the corresponding eigenvalues to calculate the eigenvectors, and obtain the following two principal component functions:

$$F_1 = 0.4289x_1 + 0.5107x_2 + 1.7586x_3 + 4.59x_4 + 11.7868x_5 - 26.911x_6$$
$$F_2 = 0.1223x_1 + 0.5623x_2 + 0.4964x_3 + 1.955x_4 + 5.1382x_5 + 13.914x_6$$

3.3.2 Estimate the Regression Equation

The regression equation was established with Eviews software, and the results are as follows:

$$Y = -723.3805 - 0.006424F_1 + 0.022483F_2$$

3.3.3 Test for Heteroscedasticity
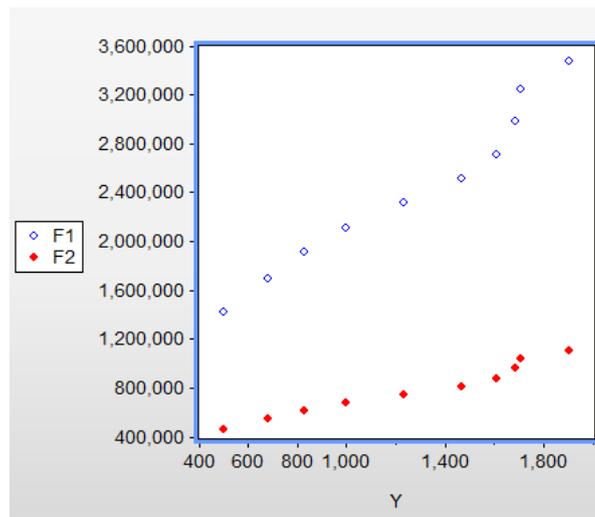
FIGURE 2 GRAPHICAL ANALYSIS TEST

Take the significance level α=0.05. Since $X_{0.05}^2 (2)=5.99>nR^2=1.8846$, there is no heteroscedasticity, and the heteroscedasticity test passes.

3.3.4 Autocorrelation Test

FIGURE 3 PARTIAL CORRELATION COEFFICIENT TEST

It can be seen from the figure that the regression model does not have a period of straight squares that exceed the dotted line, so there is no autocorrelation, and the autocorrelation test passes.

3.3.5 Multicollinearity Test
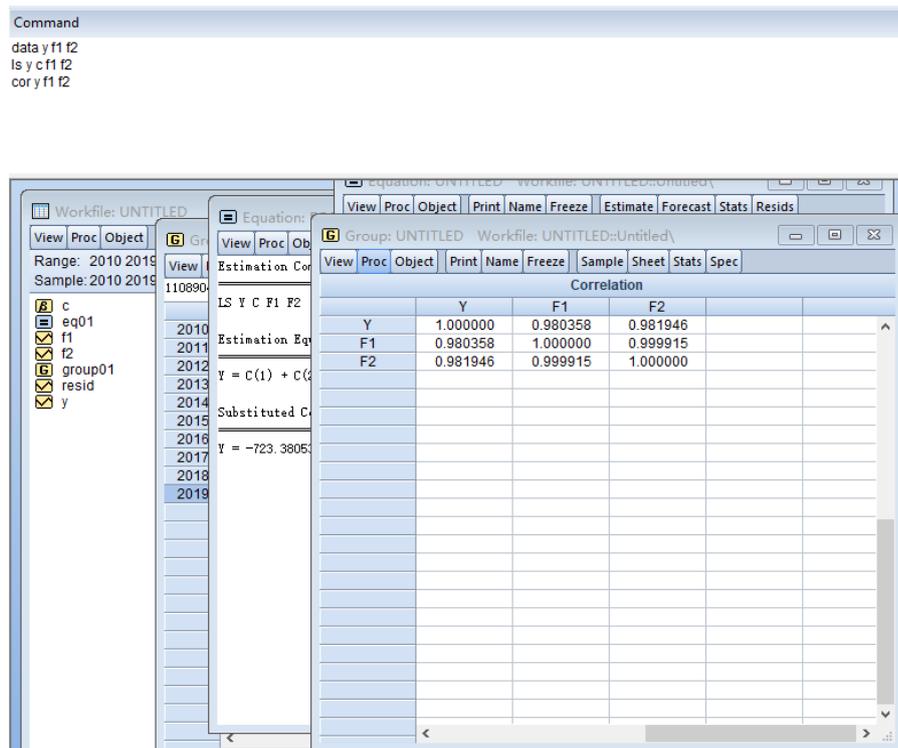
FIGURE 4 MULTICOLLINEARITY TEST

It can be seen from the correlation coefficient matrix that the correlation coefficients between the explanatory variables are all greater than 0.93, that is, the explanatory variables are highly correlated, and the regression model needs to be adjusted and improved.

3.3.6 Model Modification

Use Eviews software to directly use the stepwise regression method to solve the multi-collinearity problem that macroeconomic factors have on the SPDB stock value regression model.

The revised regression model of macroeconomic factors on SPD Bank stock value is:

$$Y = -495.0874 + 0.002239F_2$$

Then substitute F2 to get the regression equation after reduction:

$$Y = -495.0874 + 0.00027x_1 - 0.00126x_2 + 0.00111x_3 + 0.00438x_4 + 0.0115x_5 - 0.03115x_6$$

3.4 Result Analysis

In the above equation, the sign of the coefficient before the explanatory variable is positive, which is a positive influence; the sign of the coefficient before the explanatory variable is negative, which is a negative influence. The greater the absolute value of the coefficient of the explanatory variable, the greater the impact of this variable on the value of SPDB stocks.

From the above equation, it can be seen that money supply, USDCNY exchange rate, GDP, national fiscal revenue, price index and interest rate are all important factors influencing the value of SPDB stocks, and the second and fourth factors are negative effects, and the remaining four are positive To influence.

In the expected assumption:

1. Money supply versus stock price

(1) The state implements an expansionary fiscal policy and lowers bank interest rates, resulting in a substantial increase in the money supply. Money flows through the surplus, and a large part of it will inevitably flow into the stock market, driving the stock market to rise;

(2) The state implements a tight fiscal policy, raises bank interest rates, returns a large amount of funds, and greatly reduces the money supply. The decrease in the money supply caused funds to flow out of the stock market, and the stock market fell.

The money supply is positively correlated with the value of stocks.

2. USDCNY exchange rate to stock price

The impact of the exchange rate on the stock market is through the flow of funds and the performance of listed companies.

(1) The increase in the exchange rate has brought about an increase in foreign currency entering my country, which will flow into the stock market, which will be beneficial. However, for companies that need to export, the decline in product orders will have a negative impact;

(2) The decline in the exchange rate has caused the outflow of domestic currency and capital outflow, which has an advantage in exports.

This also shows that the impact of exchange rate and the stock market cannot be said to be completely positively or negatively correlated.

3. GDP versus stock price

The profit growth of listed companies depends on the growth of market demand for their products and services, and total consumer consumption accounts for a large part of GDP. Consumption types are divided into durable goods, non-durable goods and service consumption. Among them, the increase in the proportion of consumers buying durable goods will promote GDP growth, such as cars, houses and other items expected to be used for more than three years. Therefore, the rise in GDP is a signal of strong economic growth and increased consumer confidence, as well as a manifestation of economic prosperity. At this time, people's consumption activities are active, and their enthusiasm to participate in stock market investment is also high, and GDP has a positive impact on the stock market.

4. National fiscal revenue versus stock price

Fiscal revenue is an important indicator to measure the financial strength of a country's government. The scope and

quantity of public goods and services provided by the government in social and economic activities are largely determined by the abundance of fiscal revenue. Finance is a distribution relationship, a distribution relationship that takes the state as the main body and is concentrated in the social scope. National fiscal revenue is positively correlated with stock value.

5. Price index versus stock price

Generally speaking, when prices rise, stock prices rise; when prices fall, stock prices fall; generally speaking, there is a positive correlation.

6. Interest rate versus stock price

The most sensitive of the various factors affecting the stock market and stock prices is the financial factor. Among financial factors, changes in interest rates have the most direct and rapid impact on stock market conditions. Generally speaking, when interest rates fall, the price of stocks will rise; when interest rates rise, the price of stocks will fall. Therefore, the level of interest rates and the relationship between interest rates and the stock market have also become an important basis for stock investors to buy and sell stocks.

In summary, the positive and negative coefficients of the equation are consistent with the expected assumptions. Among the six factors, the national fiscal revenue, price index and interest rate have the most significant impact on the value of Shanghai Pudong Development Bank's stocks. Therefore, increasing the national fiscal revenue and price index and appropriately lowering interest rates are An important factor in the value of Shanghai Pudong Development Bank stock.

4 CONCLUSIONS AND RECOMMENDATIONS

Someone said: "China's stock market serves the real economy. The macroeconomic impact is more fundamental. The current weakening of the macroeconomic real economy will also affect the stock market's rise to a certain extent."

(1) The state increases fiscal revenue

The development of enterprises is inseparable from the development of the country. To increase the value of corporate stocks, the country needs to increase fiscal revenue. On the basis of developing production and improving economic efficiency, gradually increase the proportion of national fiscal revenue to about 80% of national income; increase the proportion of central fiscal revenue to about 60% of national fiscal revenue. This can change the fiscal dilemma and strengthen the government's macro-control functions. In terms of finance and economics, the central government must have the necessary funds, materials, and foreign exchange in order to maintain the unified leadership and command of the central government and to make effective adjustments between regions and departments.

(2) Lower interest rates

As domestic banks are highly dependent on income from spreads, reducing the cost of banking liabilities is a faster and more sustainable effective way to lower market interest rates. In order to quickly and effectively reduce social financing costs and lower the interest rate of the loan market, it is necessary to use various methods such as fiscal discounts, the banking industry to benefit the real economy, and to reduce the banking industry's debt cost. Increasing the intensity and scale of fiscal interest discounts can help companies and individuals reduce loan costs, which may reduce the pursuit of interest on deposit funds to distribute life deposits, thereby reducing the cost of debt in the banking industry. In order to reduce the cost of social financing in the long term, it is also necessary to lose no time to promote reforms, and take measures to further optimize the financing structure, dredge the transmission of policy interest rates, and optimize financial supervision to solve problems with reforms.

(3) Enhancement of corporate operating capabilities

The stock price of an enterprise can more truly reflect the historical status of the company's operations. On the other hand, the quality of the company's operation history determines the trend of the stock price. Donge Ejiao (000423) uses Ejiao as its main product. Like Yunnan Baiyao, it is a time-honored brand with a century-old history in China.

Its resources and products are unique, monopolistic and secretive. The unique core competitiveness of the company gives Dong E Jiao a strong market pricing power, and the health tonic brand that it strives to build is known as the most distinctive pharmaceutical stock in China. With the increasing awareness of health care among China's high-end population, coupled with the acceleration of China's population aging process, the demand for health care products such as donkey-hide gelatin will grow stronger. Therefore, companies should use cloud computing and other high-tech and innovative thinking to improve their own business capabilities to increase stock prices.

(4) Re-establish a strategic direction that is sufficient to support new growth points

In the past three decades, Chinese companies have encountered growth bottlenecks and can often achieve breakthroughs by improving products, expanding channels, controlling costs, and lowering prices. However, in recent years, we can clearly feel that if the quality of the product cannot obtain the consumer awareness bonus, it will only become a sunk R&D and production cost. Product sales channels are becoming stronger and more critical, and new channels are emerging one after another, but the conditions for cooperation always make companies more uncomfortable. Controlling costs and lowering prices has lost its power at the moment of consumption stratification. Blindly lowering prices at least will no longer be recognized by everyone. It is often to please consumers with low purchasing power and lose consumers with high purchasing power forever. . Therefore, it is very important to reformulate a strategic direction that can support new growth points.

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