Empirical Analysis of Macroeconomic Factors Affecting the Stock Price

WANG Lijuan, XU Ye
Shijiazhuang University of Economics, Shijiazhuang, Hebei, P.R.China, 050031
wlj333@hotmail.com

Abstract: In this paper, I use statistics from the People's Republic China’s Statistical Network, the People’s Bank of China and China Securities Regulatory Commission, use Shanghai Composite Index (SCI) as the dependent variable, choose macroeconomic indexes that can affect SCI, use SPSS for regression analysis of data and the establishment of regression model, analyze factors that affect the change of China’s stock prices, and the result shows that exchange rates, interest rates, macroeconomic prosperity index, consumer’s confidence index and the corporate goods price index are the main factors.

Keywords: stock price, macroeconomic factor, regression analysis

1 Introduction

The change in stock prices and trend of change has always been the major concern in the capital market, which affects the stability of the stock market and investor’s strategies. Which main factors affect the change in stock prices and is there a certain rule? Analysis of these problems will help us further understand the general rules of the stock market, in order to provide reference for improving the capital market. Therefore, in this paper, I combine the Shanghai composite A share index and the indexes of the entire economic development, select SCIes that can affect the general level of the stock prices of listed companies to establish multi-linear regression model for examination and the conclude the economic factors that affect the change in stock prices and the extent of their influence.

2 Empirical Analysis of Factors That Affect Change in China’s Stock Prices

2.1 Variable selection and data explanation
In this paper, I select the Shanghai composite A share index to represent the overall stock prices. I choose this index for the following two main reasons: First, the SCI reflects the change in different types of securities in the Shanghai stock market generally and from different facets. It’s sampled from the entire listed securities, which is broadly representative and can reflect the situation of the entire stock market. Second, it can reflect the situation of different industries and the general change in price. With the stock market's position in the national economy becoming increasingly important, SCI will gradually become the "barometer" to observe China’s economic operation. The sample is the related monthly statistics from January 2008 to December 2009. From the many macroeconomic factors that affect the price of listed company’s stock prices, I choose the seven most representative economic variables: exchange rate (X₁), corporate goods price index (X₂), interest rate (base rate for RMB deposit) (X₃), macroeconomic prosperity index (X₄) (the consistency index reflects the basic trend of the current economy, synthesized from industrial production, employment, social demand and social income), consumer’s confidence index (X₅), money supply (X₆), national foreign exchange reserve (X₇).

2.2 Establish multi-linear regression model
The cause-and-effect relationship between variables in many economic phenomena are always not linear, therefore in this paper, I try to establish a regression model of SCI and the factors based on the current data and use SPSS to analyze and examine the model. First, I use logic function on SCIes to make the result smoother, then establish the model combining the factors:
ln\( Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \mu \)

### 2.3 Examine the multi-linear regression model

According to the operation result of SPSS:

<table>
<thead>
<tr>
<th>Model</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig</th>
<th>95% Confidence Interval for B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.230</td>
<td>0.236</td>
<td>0.579</td>
<td>2.143</td>
<td>0.048</td>
<td>-1.524 to 2.980</td>
</tr>
<tr>
<td>X2</td>
<td>-0.771</td>
<td>0.237</td>
<td>-0.322</td>
<td>1.991</td>
<td>0.064</td>
<td>-0.500 to 1.592</td>
</tr>
<tr>
<td>X3</td>
<td>0.029</td>
<td>0.040</td>
<td>0.739</td>
<td>1.492</td>
<td>0.155</td>
<td>-0.025 to 0.143</td>
</tr>
<tr>
<td>X4</td>
<td>0.010</td>
<td>0.010</td>
<td>0.304</td>
<td>1.649</td>
<td>0.119</td>
<td>-0.005 to 0.038</td>
</tr>
<tr>
<td>X6</td>
<td>-2.617E-6</td>
<td>0.000</td>
<td>-0.232</td>
<td>-3.309</td>
<td>0.152</td>
<td>-0.000 to 0.000</td>
</tr>
</tbody>
</table>

At this time, the sig values are relatively small, so it’s statistically significant. Therefore, in this paper, I will no longer discuss money supply and national foreign exchange reserve. Use SPSS to analyze the following factors, and the result is as shown in the figure:
Regression model can therefore be derived,

$$\ln Y = -8.504 + 1.384X_1 - 0.038X_2 + 0.563X_3 + 0.083X_4 + 0.023X_5$$

### 2.4 Statistical tests

First, goodness-of-fit test. With the SPSS operating results obtained, the sample’s coefficient of determination $R^2 = 0.907$, corrected sample’s coefficient of determination is 0.881, which is a large
value, indicating that the sample’s regression equation fits the sample’s observed value well, the model goodness of fit is high and is consistent with the actual situation, and that it can reflect well the impact of various economic factors on the SCI.

Second, the significance test: t test. In the paper, the significance level is 0.05; the degree of freedom for t is 18. After looking up in the appendix, I obtained the bilaterally distributed quantize of t to be 1.73. The coefficients of factors in the paper all passed the t test and their sig values almost all reached 0. The F value of the entire regression model equation is 34.97. The estimated regression model passed the F test, which means that the equation significantly explains the influence on the SCI.

Then is the different variance test, which is done with the White test method. The results are, $R^2 = 0.907$, $T = 24$, the $T R^2 = 21.768 <X20.05 (g)$, where $g = [(k +1) (k +2) / 2] -1 = 20$, showing that model does have heteroscedasticity.

Finally, autocorrelation test, using DW (Durbin-Watson) test: DW statistic is used to test whether indexes in sequence exist between error terms. When the DW value falls on $(d_u, 4 - d_u)$, you can think that there is no sequence between error terms. Here $DW = 1.762$, so there is no sequence.

### 2.5 Analysis of the model's economic meaning

In the paper, the exchange rate, interest rates, macroeconomic prosperity index and the consumer’s confidence index coefficients are all positive, and they change in the same direction with the SCI, which means that when they change, SCI also changes in the same direction; while the corporate goods price index coefficient is negative, which changes in the reverse direction with SCI, meaning that when the corporate goods price index changes, the SCI shows a reverse change. Using this model can analysis the SCI: in the Shanghai stock market, specifically speaking, when the exchange rate rises by one unit, the SCI rises by 1.384 percentage; when the interest rates rises by one unit, the SCI rises by 0.563 percentage; when the macroeconomic prosperity index rises by 1 unit, the SCI rises by 0.083 percentage; when the consumer’s confidence index rises by one unit, the SCI rises by 0.023 percentage; in contrary, when the corporate goods price index rises by 1 unit, the SCI drops by 0.038 percentage.

### 3 Analysis of the Principle by Which Relevant Factors Affect the Stock Prices

Here I analyze the reasons for relevant factors affecting the stock price:

#### 3.1 Exchange rate

Exchange rate has an increasingly big impact on China's stock index, especially after the reform of RMB exchange rate in the July 21, 2005, and now the ratio between RMB and American dollars has reached 6.80:1. According to experience from abroad, the relationship between exchange rates and stock market is: the national currency appreciation - hot money inflows - the stock market rising - attracting more hot money inflows - increasing the upward pressure. Stock market is an important window to observe the flow of “hot money” abroad. After “hot money” flows in, they will wait for opportunity. Once the stock market breaks through, they will throw themselves into the stock market like hungry tiger running down the mountain, which causes the stock market to rise crazily, attracting more “inflow”. This is consistent with the real situation.

#### 3.2 Interest rate

In general, among all the macroeconomic factors, interest rate has the most direct and greatest impact on the stock market. When the interest rate rises, saving profits increase, which attracts some of the money flow from stock market to bank deposits, resulting in decreased demand for the stock and naturally reduced stock prices. However, in the medium and long term, the interest rate movement and the stock price movement are not simply negatively correlated, because the stock price is not only affected by interest rate, but also many other factors. It’s not decided by a single factor, for example, there is no interest rate rise in China in 2001, but the stock index began a downward trend. In the paper, I selected
data from 2008 to 2009, during which the rate has only been reduced once, and the data is not sufficient to fully reflect the relation between interest rate and SCI, so the coefficient is positive.

### 3.3 Macroeconomic prosperity index

Macroeconomic prosperity index is positively correlated with stock price. The higher the prosperity index is, the faster the economic development, and then the money supply is sufficient, stock demand increases, and stock price increases. Otherwise, the economic prosperity index decreases and stock price drops.

### 3.4 Consumer’s confidence index

Consumer’s confidence index is positively correlated with stock price, because the higher the consumer’s confidence index, the more optimistic they feel about the future, so they will use the money to invest rather than store, then the stock demand increases and the price increases; when the consumer’s confidence index drops, it means that consumers are not certain about the future economy, then most people will choose storage, then the stock price decreases.

### 3.5 Corporate goods price index

Corporate goods price index reflects the trend of price movements in centralized trading of goods between domestic enterprises. The monthly corporate goods price index published by the central bank reflects the centralized the level change of investment and consumer goods in the centralized trading between enterprises, which is one the price indexed used to measure inflation level, and offers reference for the central bank to develop and adjust monetary policy. Corporate goods price index is negatively correlated with stock prices, so when the corporate goods price index rises, the cost for companies to buy raw material rises, causing profit margin and stock price to decline.

### 4 Conclusion

The empirical analysis of factors that affect the change in stock price shows that the change in stock price is mainly affected by the exchange rate, interest rate, macroeconomic prosperity index, consumer’s confidence index and corporate goods price index. Stock price is the result of many factors and it changes all the time. Except for the five major factors, it’s also affected by GDP, economic cycle, balance of international trade payments and others, only that their impact is not as huge as that of the previous five elements. China’s stock market has just begun and is still a new market. Although in recent years it has progressed rapidly, it still has many shortcomings, which needs study and the making of relevant strategies to lead it towards a positive development, so as to stimulate the development of financial market and China’s economic prosperity. When making relevant strategies, officials need to consider the impact of various factors, so that they can make correct and effective measures.

### References