

A Brief Overview on Influence of Financial Factors on Stock Prices of Listed Company

An Case Study of Chinese Home Electrical Appliance Industry

Shenghui Qiao^{1, *}

¹University of Toronto

*Corresponding author: shenghui.qiao@mail.utoronto.ca

Abstract. This study aims to investigate the effect of financial factors on stock prices, and find out which factors are most statistically significant to the change of stock prices. Based on the information of 16 listed companies in Chinese home electrical appliance industry, three simple linear models are built and compared. The final model suggests that earnings per share, operating income per share, debt-to-asset ratio are statically significant to a company's stock price. Besides, intrinsic diversity between companies contribute to difference in their stock prices.

Keywords: Business analysis, Stock price, Home electrical appliance.

1. INTRODUCTION

In recent years, the Chinese economy grows in a rapid pace, bringing on an improvement in people's living standard. Naturally, the growth of wealth is accompanied by an increase in consumers' expectation and requirement of the quality of consumer goods. More and more consumers tend to choose high-quality, durable, and functional goods when making a purchase [1]. The boom in consumption causes a consequential heat in investment. The Chinese stock market has been improved and perfected in the last 30 years of continuous development, and the number of investors had been increasing [2]. A large number of investors use stocks as a tool of investment, and the stock price is the most straightforward and available information for them to make investment decisions [3]. Therefore, researches on what factors may have the most effect on the stock prices become significant to the market.

Generally, multiple factors could be affecting the stock prices of listed companies. Macroscopically speaking, factors such as aggregate the price level, interest rate, international economy, and stage on business cycle can potentially affect a company; in a micro sense, factors including the management of company, innovation ability, decision-making council and so on will also have an influence on the stock price [4]. This article, however, will only focus on the financial indices of a company, which are straightforward enough to provide information for investors and diversified enough across different companies, and discuss their influence on the company's stock price.

The home electrical appliance industry is one of the most common and representative industries in Chinese market. This article aims to use the Chinese home electrical appliance industry as an example to investigate what financial factors have the greatest influence on the stock prices of listed companies. Section 2 provides an overview of the data and methods used in the analysis. Section 3 builds a model based on response variable and certain predictors. Section 4 presents a discussion of outcomes and findings. Finally, section 5 provides a conclusion to the entire investigation.

2. METHOD

The data used for this analysis is from the WIND database, which provides large amounts of financial information in China. The data contains information of 16 listed companies which are in Chinese home electrical appliance A-share market from year 2017 to 2021. This information include date, company's name, stock prices, and 14 other important financial indicators such as earnings per share, current ratio, inventory turnover, etc. To make the analysis more accurate, when scraping data

from WIND, information that has serious incompleteness or missing of data within the selected time period is dropped.

Among all variables, stock prices of each company is the target of analysis, the response variable. As mentioned in the introduction, stock price is one of the most accessible indicator of a listed company's financial performance – “the profitability and inherent value of the firm” [5]. Variable date represents the year that the information is collected, and it shows possible effect of time on the market in general. Variable company represents any effect caused by a difference between companies that cannot be attributed to financial or business reason, such as brand effect, managing level, human resource, etc. As this analysis is based on the annual outcome and performance of companies, date is originally in format of “year-12-31”, which marks the end of December of each year. However, for the purpose of model building, this variable is changed to be a four-digit number that only indicates the year (e.g. 2017). Similarly, since company's name is a categorical variable, dummy variables are used to represent each unique company. For example, company “Midea Group” is expressed as 1 and company “GREE Electric Appliances Inc. of Zhuhai” is expressed as 2.

Other variables are financial indicators of each company, and they reveals the operating level of each company from different aspects [6]. Specifically, name of these selected financial indicators are listed as below. They are divided into four categories by their function, in order to provide a better overview of the company's operating level from different dimensions.

1. Profitability:

Earnings per share (CNY)

Net asset value per share (CNY)

Operating income per share (CNY)

Weighted return on equity (%)

2. Solvency:

Debt-to-asset Ratio (%)

Current Ratio (%)

3. Operating Ability:

Inventory turnover Ratio (%)

4. Capacity of Growth:

Year-over-year growth rate of earnings per share (%)

Year-over-year growth rate of gross revenue (%)

Year-over-year growth rate of net profits attributed to shareholders of parent company (%)

Year-over-year growth rate of net cash flows from operating activities (%)

Based on these variables, a simple linear model will be built to further investigate the relation between stock price and different predictors. Then, the most significant predictors would be selected by their p-value. An analysis on these significant variables will be conducted.

3. MODEL BUILDING

This article aims to analyse which factors have the most important effect on the stock prices of a listed company in the home electrical appliance industry. The response variable is stock prices. Observations in the data set are independent from each other because they are collected from different companies. That is, there is no grouping of data. Also, the distribution of response variable indicates no need to apply unique response type to the model (binomial, Poisson, etc.), so the preferred response type is simply linear. Therefore, a simple linear model would be suitable for the data and further analysis.

The simple linear model assumes that:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + \cdots + \beta_n X_n + \epsilon \quad (1)$$

where:

Y is the linear response that is the stock price of each company in a single year;

X_k is predictors or independent variables;

β_0 is the y-intercept;

other β_k is the coefficient for each corresponding predictor;

n is the number of predictors.

The data contains 11 independent variables in total. Using these predictors, three models are built. These 3 models are nested; they have the same response but different predictors:

Model 1: predictors are date, company, earnings per share, current ratio, inventory turnover ratio, and year-over-year growth rate of gross revenue.

Model 2: predictors are date, company, earnings per share, operating income per share, current ratio, debt-to-asset ratio, inventory turnover ratio, year-over-year growth rate of gross revenue, and year-over-year growth rate of earnings per share.

Model 3: predictors are date, company, earnings per share, net asset value per share, operating income per share, weighted return on equity, current ratio, debt-to-asset ratio, inventory turnover ratio, year-over-year growth rate of gross revenue, year-over-year growth rate of earnings per share, year-over-year growth rate of net profits attributed to shareholders of parent company, and year-over-year growth rate of net cash flows from operating activities.

With ANOVA test and likelihood ratio test, these three models are compared using stock price as response. The results for ANOVA are shown in table 1 and likelihood ratio test are shown in table 2.

Table 1. Results of ANOVA Analysis

	Df	Sum Sq	Mean Sq	F value	Pr. F
Model 1					
Date	1	953.98	953.98	4.25	0.04
Company	1	12206.67	12206.67	54.34	0.00
Earnings Per Share	1	17066.75	17066.75	75.98	0.00
Current Ratio	1	1109.98	1109.98	4.94	0.03
Inventory Turnover	1	328.69	328.69	1.46	0.23
Growth of Gross Revenue	1	333.45	333.45	1.48	0.23
Residuals	62	13927.37	224.64	NA	NA
Model 2					
Date	1	953.98	953.98	5.11	0.03
Company	1	12206.67	12206.67	65.41	0.00
Earnings Per Share	1	17066.75	17066.75	91.45	0.00
Operating Income Per Share	1	490.69	490.69	2.63	0.11
Current Ratio	1	643.67	643.67	3.45	0.07
Debt-to-Asset	1	2875.04	2875.04	15.41	0.00
Inventory Turnover	1	408.41	408.41	2.19	0.14
Growth of Gross Revenue	1	262.31	262.31	1.41	0.24
Growth of Earnings Per Share	1	8.37	8.37	0.04	0.83
Residuals	59	11011.00	186.63	NA	NA
Model 3					
Date	1	953.98	953.98	5.47	0.02
Company	1	12206.67	12206.67	69.93	0.00
Earnings Per Share	1	17066.75	17066.75	97.78	0.00
Net Asset Value Per Share	1	44.27	44.27	0.25	0.62
Operating Income Per Share	1	457.96	457.96	2.62	0.11
Weighted Return on Equity (%)	1	1139.29	1139.29	6.53	0.01
Current Ratio	1	131.37	131.37	0.75	0.39
Debt-to-Asset	1	2359.85	2359.85	13.52	0.00

Inventory Turnover	1	578.54	578.54	3.31	0.07
Growth Rate of Gross Revenue	1	230.59	230.59	1.32	0.26
Growth Rate of Earnings Per Share	1	20.32	20.32	0.12	0.73
Growth Rate of Net Profits Attributed to Shareholders	1	1137.34	1137.34	6.52	0.01
Growth Rate of Net Cash Flows From Operating Activities	1	0.03	0.03	0.00	0.99
Residuals	55	9599.92	174.54	NA	NA

Table 2. Results of Likelihood Ratio Test

	X. Df	Loglikelihood	Df	Chisq	Pr(>F)
Model 1	8	-281.016	NA	NA	NA
Model 2	11	-272.910	3	16.212	0.001
Model 3	15	-268.178	4	9.463	0.051

Based on the ANOVA analysis and likelihood ratio test, the second model (model 2) suits best of the data.

The composition equation of model 2, which is the final model, looks like:

$$Y = \beta_0 + \beta_1 * date + \beta_2 * company + \beta_3 * earnings \text{ per share} + \beta_4 * \text{operating income per share} + \beta_5 * \text{current ratio} + \beta_6 * \text{debt to asset ratio} + \beta_7 * \text{inventory turnover} + \beta_8 * \text{growth rate of gross revenue} + \beta_9 * \text{growth rate of earnings per share} \quad (2)$$

A correlation plot is created to visualize the correlation between each predictor and response, which is the third variable, 'Stock Price (CNY)'. Among all predictors, earnings per share, net asset value per share, and weighted return on equity have relatively large correlation, which are 0.8, 0.74 and 0.68 respectively. Besides, company has a negative correlation of 0.5 with stock prices. While the negative sign has no actual meaning in this case, the magnitude of correlation reveals that the intangible differences between companies have an impact on stock prices.

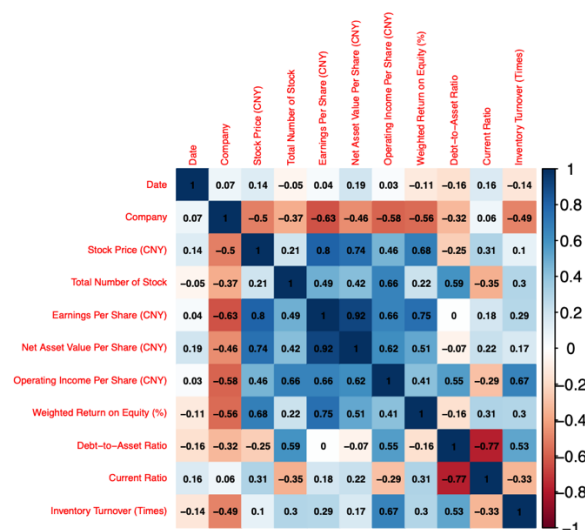


Figure 1 Correlations Between Variables

Usually, large correlation between predictors will affect the accuracy of model results. As shown in figure 1, some pairs of predictors have large correlation, however, this correlation is caused by the nature of predictors rather than problem in measurement. For example, current ratio and debt-to-asset ratio are two similar measures of the company's solvency and this similarity is represented by a high correlation of -0.77. Also, weighted return on equity and earnings per share have a correlation of 0.68, which can also be explained by the internal relevancy between two predictors. When analysing results

of the chosen model, it is necessary to account for the relatively large correlation between predictors. However, for this model, correlation doesn't cast questions on the validity of model.

Therefore, one can hypothesize that earnings per share, net asset value per share, weighted return on equity, and company will have great statistical significance in the chosen model. It is likely that these variables affect stock prices more than others do.

4. DISCUSSION

The final model has 9 predictors in total, which are date, company name, earnings per share, operating income per share, current ratio, debt-to-asset ratio, inventory turnover ratio, year-over-year growth rate of gross revenue, and year-over-year growth rate of earnings per share. Some factors could be more significant than others. To investigate on the significance of each predictor, a summary of the model coefficients is shown in table 3. Taking 0.05 as the threshold, company, earnings per share, operating income per share, and debt-to-asset ratio are statistically significant. They have very small p-values, indicating that we have strong evidence to reject the null hypothesis that these variables have no effect on observed outcome.

Table 3. Summary of Final Model

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2045.678	2549.783	-0.802	0.426
Date	1.056	1.261	0.837	0.406
Company	-1.387	0.547	-2.538	0.014
Earnings Per Share	9.785	2.721	3.596	0.001
Operating Income Per Share	0.836	0.341	2.454	0.017
Current Ratio	-5.629	4.178	-1.347	0.183
Debt-to-Asset	-0.984	0.260	-3.780	0.000
Inventory Turnover	-3.117	1.753	-1.777	0.081
Growth of Gross Revenue	0.128	0.110	1.169	0.247
Growth of Earnings Per Share	0.003	0.012	0.212	0.833

According to this model, for each 1 unit increase in date, the overall stock prices goes up by 1.05588 (CNY), which means the overall trend of stock prices in market is increasing over year. Since this variable represents the time period from 2017 to 2021, the coefficient indicates that although the COVID-19 stroke Chinese market in 2019, the overall stock prices of company in home electrical appliance industry continue to increase under pandemic [7]. Also, each 1 unit increase of company (which means changing to a new company as this is a categorical variable) causes a 1.38726 decrease of stock price. This is likely to be caused by the sequence and coding of company names in the data set, and as the sequence does not follow a certain pattern, it is very hard to interpret this coefficient. The dummy variable does not provide much useful information about how the stock price varies

across companies, but the scale of coefficient, which is greater than 1, reveals that stock price is indeed affected by the difference between companies to a certain degree.

Based on this model, earnings per share and operating income per share have positive relation with stock price. Both variables indicate profitability of the company. However, 1 unit increase in earnings per share will lead to 9.78461 increase in stock prices while 1 unit increase in operating income per share only leads to an increase of 0.83612 in stock prices. While both indicators are significant to stock prices, any change of earnings per share obviously leads to a greater movement of stock price of any company. According to Ushman, “the EPS growth only needed to be a steady incline and not necessarily at a rapid pace” [8]. That is, firm who has a consistent growth of earnings per share would have a higher return on investment [8].

Current ratio, debt-to-asset ratio and inventory turnover have negative relation with the stock prices based on this model. Two solvency indicators, current ratio and debt-to-asset, have coefficients of -5.62862 and -0.9843 respectively. Current ratio and debt-to-equity ratio measures liquidity of a company as they reflect “the company’s ability to meet its obligations shown by some part of its own capital or equity to reduce debt” [9]. Under normal conditions, higher current ratio and debt-to-asset ratio indicate better ability of company to meet its short-term debts, indicating that the company is operating well or in a healthy condition, which attracts investors and increases the company’s stock price [10]. The negative coefficient given by the model, however, could be a result of pandemic’s impact on Chinese market. During an economy recession, consumers pay more attention to the greater risk associated with more debts – which is shown by higher current ratio and debt-to-asset ratio. Therefore, investors may invest less or even withdraw investment from companies with a higher current ratio, which leads to a decrease in stock price.

As a company has one more time of inventory turnover within a year, the stock price decreases by 3.11663. Usually, a higher inventory turnover indicate stronger sales of a company, which is associated with higher stock price. However, if the overall industry of home electrical appliances is saturated and most companies already have the optimal inventory turnover, any increase in inventory turnover at this point will be inefficient because the company has to limit its revenue to fit a too-small inventory. Therefore, if the market for home electrical appliances is mature enough, increasing inventory turnover may have a negative impact on stock prices.

Lastly, year-over-year growth rate of gross revenue and of earnings per share have a positive relation with stock prices. The measure of growth rates indicate the direction and magnitude of change in a specific variable over a year. The percentage growth rate of gross revenue has a coefficient of 0.12808 and the growth rate of earnings per share has a coefficient of 0.00257. Because these two growth rates represents the company’s overall ability and investment prospects, company with higher growth rate are more likely to attract investors and so have a higher stock price. For example, in 2020, the Midea group had a annual growth rate of gross revenue of 2.27 (%) and a stock price of 58.17 (CNY). In 2021, the growth rate of gross revenue rose to 20.18, leading to a great increase in stock price, which was approximately 98 (CNY).

5. CONCLUSION

This analysis investigates the influence of different financial factors on stock prices and discusses which factors have the most significant effect by taking the Chinese home electrical appliance industry as an example. The research is based on data from 16 listed Chinese company between 2017 and 2021. A simple linear model with appropriate number of predictors is chosen to be the final model, in order to find out which factors are most important to stock price.

Among all financial factors, earnings per share, operating income per share, and debt-to-asset ratio are the most statistically significant ones according to the model. These factors are all important measures of a company’s profitability and solvency, which reveals the company’s overall ability to operate and develop. Moreover, other intrinsic difference between companies affects the stock price.

This difference could be integrated and intangible, such as brand effect, difference in decision-maker, etc.

The findings of this analysis could be helpful to future analysis of home electrical appliance industry, and it can also provide reference for other industries in Chinese stock market. In conclusion, understanding different aspects of the company, rather than only care about the stock prices, before making investing decision would be beneficial to every investor.

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