

An Empirical study on affecting factors of stock returns based on the structural equation model-manufacturing as the example

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Abstract

This paper uses the structural equation model, and selects 300 listed companies of manufacturing as the research object, and chooses investor sentiment, profitability and financial index as potential variables, selects a few observed variables to study the influence on stock returns. The results found that profitability, investor sentiment and financial index have certain influence on stock returns, and it is a positive correlation. The biggest impact on stock returns is profitability, and then followed by the investor sentiment and financial conditions. In this paper, the research provides a certain reference for investors to make rational investment decisions.

Keywords: manufacturing, stock returns, structural equation

1 Introduction

The securities market develops constantly and becomes standardized with the arrival of the institutional investors and the economic globalization. The proportion of investment activities in the human activities is growing. At the same time, the affecting factors of the behavior of investors on stock returns are also changing constantly more urgent and challenging than ever.

Stock investment is an important part of the investment activities. The price volatility of the stock market is the foundation of the stock market, and it is the focus of stock investors. There are many studies about the affecting factors on the stock price, Su Baotong, Chen Wei, Chen Langnan found that the company size, book value ratio, cash dividend rates and the proportion of tradable shares had a significant effect on stock returns on Chinese stock market [1]. Chen Xinyuan, Chen Donghua and Zhu Hongjun used single factor and multi-factor model to analyze it and found that earnings per share, net assets, residual income, shares and equity size had a significant effect on stock price [2]. Mott, Kelso, Kiseadden and Maccodo analyzed and determined the profit overseas, price-to-book ratio, price-to-earning ratio and firm size were the four main influencing factors [3]. Garlappi and Yan proposed a theoretical model, and found that the impact of market value and stock trading on stock returns was due to macro factors [4]. Hou et al. found that multi-factor model had a significant correlation on the stock returns including the momentum factor and price factor of cash flow after the research by more than 27000 stocks of monthly yield of 49 countries [5]. Ang et al., Guo and Savickas suggested that there had a significant negative correlation relationship between stock returns and stock idiosyncratic volatility through the study of the U.S. stock market,

On the studies of the effects of investor sentiment on stock returns [6, 7]. Baker analyzed the emotional impact on stock price mechanism in theory. On the empirical test he

explored the measure indexes of investor sentiment, and selected six indicators including turnover rate, closed-end fund discount rate, IPO quantity and the yield of the first day, bonuses premium rate and equity distribution ratio to made the principal component analysis, and built composite investor sentiment indexes to measure the mood, finally he found that mood had a significant important influence on individual stocks [8, 9]. Zhang Liping, Wang Lin through the empirical analysis by EGARCH model found that investor sentiment index had strong explaining ability on stock returns [10].

Based on the above research results, this paper divides the factors that affect stock returns into three categories: investor sentiment, profitability and financial indicators. And it selects manufacturing listed companies as the research object, using structural equation model to analyze the affect factors on stock returns. The explained variable is the stock investment yield, and investor sentiment, profitability and financial index is potential variables, then selects observed variables which can measure the potential variables to make structural equation model. This paper uses the structural equation model, the results are more reliable, and the influence factors in this paper are more systematic and comprehensive, which make it can comprehensively reflect the impact factors on stock returns. This study can make investors understand the current market situation and factors affecting stock returns correctly, it can also improve investor's investment decision-making level, and it has the profound significance for the rational allocation of resources to promote the securities market.

2 Theoretical analyses and the variable selection

2.1 THEORY ANALYSIS

Structural Equation Model is a kind of statistical analysis technology based on the causal theory with the corresponding linear Equation system indicates, its aim is

exploring the causal relationship among things, and the relationship is expressed by the causal model or path graph. Structural equation model integrates the path analysis and confirmatory factor analysis and other statistical test method, which can explain the causal relationship among variables. At the same time, it makes up the shortcomings of the factor analysis, considers the error factors, and it doesn't need to be limited by the assumptions path analysis.

Structural equation model includes measurement model and the structure model. Measurement model can obtain the relationship between the observation indexes and the potential variables, structure model can obtain the relationship between the potential and the potential variables. Measurement Model is generally composed of two Equations that are expressed as:

$$X = \Lambda X \xi + \delta, \tag{1}$$

$$Y = \Lambda Y \eta + \epsilon. \tag{2}$$

Among them, X is the measurement variable matrix of ξ ; Λx is the measurement coefficient matrix, ξ is the potential exogenous variables matrix; δ is the residual error matrix of the measurement equations, Y is the measured variables matrix of η ; Λy is the measure coefficient matrix, η is the potential endogenous variable matrix, ϵ is the residual matrix of the measurement equation.

Structure Model is the explanation of the causal relationship Model among the potential variables. Structural model is expressed as:

$$H = I_0 + I_1 \Gamma_1 + I_2 \Gamma_2 + \dots + I_3 \Gamma_3 + \epsilon \text{mb} \tag{3}$$

ϵ_i is the residual, it is the variables that cannot be explained by independent variables, it is the measurement error in the measurement model, and in the structure model it is the interference or residual. It is the inside potential variables that cannot be explained by outside potential variables or other inside potential variables [11].

2.2 DESIGN VARIABLES

To study the influence factors of stock investment returns, this paper constructs structural equation model with manufacturing industry as the example, stock investment returns is the explained variable, and investor sentiment, profitability, financial indicators is the independent variables, then selects observed variables that can explain the potential variables. It selects closing price, volume, transaction amount, and turnover rate and price-sales ratio to measure investor sentiment. Closing price reflects the changes of closing price in a time, if closing price rises stable then investor sentiment will be optimistic; Volume reflects the market liquidity, it reflects the investor's participation, if investor sentiment is optimistic, volume will be large; transaction amount and investor sentiment has certain connection, transaction amount rising stable, investor sentiment will be optimistic; Turnover is the ratio that the volume and the total number of shares in a period of time, the bigger it is, the stronger the stock liquidity is; Price-to-sales ratio is the ratio of share price and share sales, it is lower, the greater the investment value of the stock is. It selects earnings per share, p/e ratio, price-to-book value and book value ratio as observed variables to measure

Profitability. The book value ratio is a risk factor that reflects the stock market investors' expectations on the company's market. The specific variable design is the table below:

TABLE 1 Variable designing

Potential variables	Observed variables
Investor sentiment	closing price a1, volume a2, transaction amount a3, turnover rate a4, price-sales ratio a5
Profitability	earnings per share a6, price-to-earning ratio a7, price-to-book ratio a8, book value ratio a9
Financial indicators	return on assets a10, financial leverage coefficient a11, net profit growth a12, liquidity ratio a13, asset-liability ratio a14
Stock investment returns	stock investment returns Y

Among them, the turnover rate = volume in a period ÷ total number of shares

Price -sales ratio = stock price ÷ sales of per share

Price-to-earning ratio = share price ÷ earnings per share

Price-to-book ratio= price per share ÷ net assets per share

Financial leverage coefficient = (total profit + finance expenses) ÷ total profit

After the Indicator design is completed, this paper uses Amos17.0 software to construct the initial structural equation model as follows:

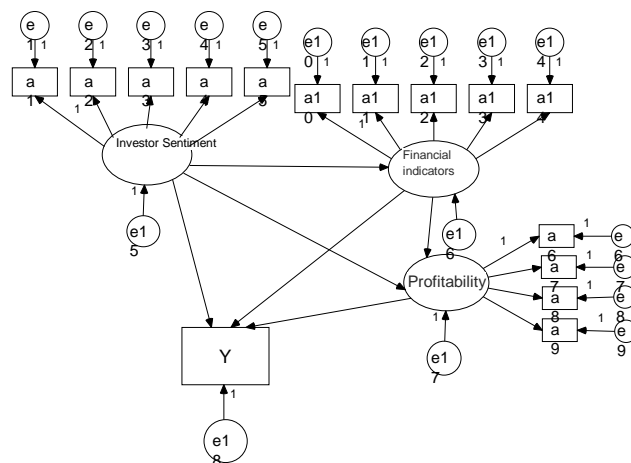


FIGURE 1 Initial structural equation model

Where Y is the stock investment returns, ai is observed variables, ei is residuals of ai.

3 Model construct

3.1 MODEL CONSTRUCT

To study the influence factors of stock investment returns, this article selects 300 listed companies in 2013 of manufacturing as the sample (data are all from CSMAR database and Ruisi database), then uses Amos17.0 software to carry on the fitting, when the model box is (OK: Default model), it means that it can display parameter estimates, and that there is no problem in theory model defining. With that standard, the model is fitted and the result is as follows:

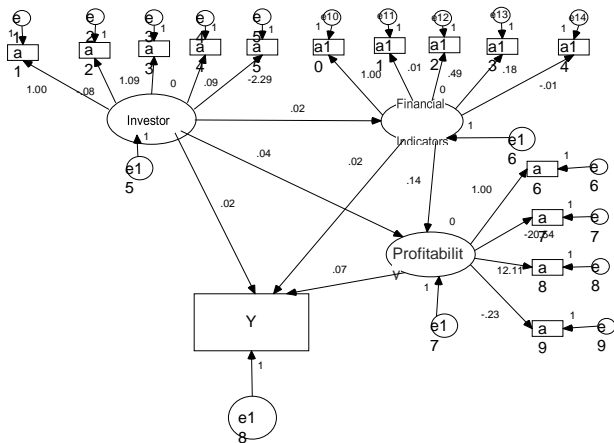


FIGURE 2 Structure equation model

3.2 MODEL TEST

Then we uses Amos17.0 to analyze and test the model, the results are as follows:

TABLE 2 Standardized regression coefficients and the significance test

			Estimate	S.E.	C.R.
Financial Indicators	<--- Investor Sentiment		.020	.053	.379
Profitability	<--- Investor Sentiment		.044	.007	6.442
Profitability	<--- Financial Indicator		.137	.046	2.967
a1	<--- Investor Sentiment		1.000		
a2	<--- Investor Sentiment		-.081	.222	-.366
a3	<--- Investor Sentiment		1.094	.136	8.062
a4	<--- Investor Sentiment		.095	.581	.163
a5	<--- Investor Sentiment		-2.290	8.914	-.257
a6	<--- Profitability		1.000		
a7	<--- Profitability		-20.54	73.598	-.279
a8	<--- Profitability		12.115	3.882	3.121
a9	<--- Profitability		-.235	.037	-6.367
a10	<--- Financial Indicator		1.000		
a11	<--- Financial Indicator		.012	.041	.285
a12	<--- Financial Indicator		.491	.208	2.363
a13	<--- Financial Indicator		.177	.499	.354
a14	<--- Financial Indicator		-.010	.003	-3.547
Y	<--- Financial Indicator		.019	.010	1.992
Y	<--- Investor Sentiment		.020	.007	2.960
Y	<--- Profitability		.069	.010	2.697

Among them, Estimate represents the estimated value of the influence coefficient, CR is the test statistic, when it is greater than 1.96, and it indicates that the parameter is significant. Obviously, among them investor sentiment to the profitability, financial indicators to profitability, a3 to investor sentiment, a8, a9 to profitability, a12, a14 to financial indicators, financial indicators and investor sentiment and profitability to Y are all passed the text reach the significance level, it also means that C.R > 1.96.

4 Model analyses

We can get the following conclusion from the above research:

- 1) Profitability, investor sentiment and financial index

have a certain influence on stock returns, and they are all positive correlation. When profitability increase, stock returns also increase; when investor sentiment is more stable and optimistic, stock returns will relatively be better; when company's financial run well, the stock returns will be higher. And the biggest impact on stock returns is profitability, it reaches 0.069, and then followed by the investor sentiment and financial conditions.

2) The influence of the profitability on the stock returns is the largest. The price-to-earning ratio and book value can explain stock returns among the profitability index factors. The most significantly of the influence on stock returns is price-to-earning ratio, and the second is book value ratio. The higher the price-to-earning ratio is, the greater the returns, the greater the book value ratio, the returns is lower.

3) The impact of investor sentiment on stock return is only after profitability, it reaches 0.02. Among the investor sentiment index factors, transaction amount has the explain ability to stock returns, the larger the transaction amount, the better the benefits.

4) Company's financial status also has a certain influence on stock investment returns. Among the financial conditions index factors, net profit growth rate, the asset-liability ratio have explain ability to stock investment returns. The greater the net profit growth rate is, the better the returns will be; and the lower the asset-liability ratio is, the greater the benefits will be.

5) There also have a certain relationship between the profitability, investor sentiment and financial indicators. Profitability has positive effects on investor sentiment; the influence coefficient is 0.04, the better the profitability, the investor sentiment will be more optimistic. Profitability and financial situation also has a positive relationship. In Certain conditions, the better the profitability is, the better the company's financial situation will be.

5 Investment advices

Investors should establish correct investment philosophy, and make their sentiment stable, and invest rationally. Investors should make a comprehensive understanding of Chinese stock market, then make full analysis according to the different characteristics of each industry and its own condition, and invest rational. Investors should have confidence in their investment activities, at the same time they should be alert to the risk factors, and pay attention to the returns, but they also cannot ignore the risk.

Enterprises should establish a good operation mechanism, and improve their profit ability, then improve the financial situation. A company which has reasonable mechanism can get higher returns. So enterprises should establish and improve the internal operation mechanism, establish the integrity operating system, improve corporate governance structure, reduce the risk of management, and perfect the internal constraint mechanism, finally ensure that the enterprise operates well.

The securities supervision institutions should strengthen supervision. They should Increase information disclosure scrutiny of the listed company, and strict enforcement of relevant laws and regulations, and punish illegal operation of the enterprise severely. They should establish internal restraint mechanism, and improve the stock market

operation mechanism, and improve the transparency of the market information, then build a healthy investment platform for investors and listed companies.

6 Conclusions

Now investment activity is become a new hot spot of human financial activities, and an empirical analysis of the influence factors on investment returns can provide certain reference for investors, and it can make the enterprise more efficiently. this paper uses the structural equation model, chooses stock investment returns as explained variable, and profitability, investor sentiment, financial indicators as potential variables, then selects observed variables which can explain potential variables to do empirical analysis, finally finds that profitability, investor sentiment and the

company's financial situation have positive correlation on the stock investment returns. Knowing these things can help investors make scientific decisions, and invest rationally. In addition, it provides some suggestions for improving the efficiency of investment from three angles that is the investors, listed companies and securities institutions to ensure the healthy and stable development of the capital market.

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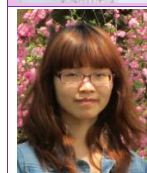
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