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Research on investor sentiment stock pricing model based on the insurance industry

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ABSTRACT

In the market of certainty, the problem of asset pricing is simple; while there is too much uncertainty in financial market. Under the condition of uncertainty, investors' attitude to risk and investors' psychological emotional impact on asset pricing must be taken into consideration, meanwhile, the effect of time on capital asset pricing also need to be taken into consideration. In this paper, from April 2011 to December 2013, all stock trading data of China life insurance company are taken as samples, to investigate the relationship between the closing prices of stocks and psychological sentiment of shareholders, we use the least squares method to build the model and to analyze the model, the psychological sentiment of shareholders through dividend yield, turnover rate, PE ratio (price earning ratio), yields five index systems to quantify, the result is that the sentiment of investors influences the closing prices of the stocks.

KEYWORDS

Asset pricing; Psychological sentiment; Turnover rate; Price earning ratio; Indictor system.

INTRODUCTION AND LITERATURE INTERVIEW

The influence of the sentiment on the prices of the stocks is mainly reflected in two aspects: one is in the sentiment for the whole systemic effect of stock market to produce the overall effects, namely the Aggregate Effect; the other is in the sentiment for the different effects on different stocks, namely the Cross-sectional Effect. Many studies of the scholars have shown that investor sentiment influences the capital asset pricing, such as Charoenrook through annual change of the university of Michigan consumer sentiment index to measure investors' sentiment, to review the relation between sentiment and the gains of the stock market, and to test whether the change of the sentiment affects returns of the stocks, he found that consumers' sentiment in both monthly and annual forecasted the market excess earnings. Basu (1977) put forward P/E ratio (P/E) for the first time, he found that in the company P/E ratio based portfolio structure, the low P/E ratio of company stock portfolio yield is higher, while high p/e ratio of stock return is low[1]; Malcolm Baker and Jeffrey Wurgler (2006) studied how investor sentiment affects stock returns, and predicted that group investors who have a subjective opinion had the greatest influence on stock returns, demonstrating results confirmed this point[2]; Capital markets "herd" shows that investors' psychological factors and various emotions easily affect the capital asset pricing. Banz (1981) according to the size of the market capitalization of all stocks listed on the New York Stock Exchange to group, found that the excess returns adjusted by CAPM with the rise in the market value of the company into a downward trend, the average monthly income composed of minimum value of company stock portfolio was 1.65% higher than the average monthly income composed of maximum value of company stock portfolio[3]; Jiang Yumei, Wang Mingzhao (2010) discussed the influence of investor sentiment on the cross-section share price, the study results shown that investor sentiment has a certain influence on current and future short-term relative excess returns, the effect of the sentiment on cross sectional gains exists[4]; Sun Jianjun and Wang Meijin with CCTV Kanpan of survey data to directly measure investor sentiment, confirmed that the investor sentiment has a significant effect on market returns and volatility, further illustrated the sentiment is the influence factor of asset pricing. Compared with abundant achievements of foreign scholars, there is almost no research of Chinese scholars for the sentiment and the relationship between asset pricing, so the focus of this paper is to quantify the investor sentiment, the study found that stock dividend rate, p/e ratio, yield, turnover rate can be used as a quantitative index of investor sentiment, so we can through the quantitative indicators to analyze the influence of investor sentiment on asset pricing.

BEHAVIORAL FINANCE THEORY

Behavioral asset pricing theory is the core of behavioral finance, however, two reality theoretical foundation of the behavioral finance are: limited arbitrage and investors psychology analysis, the form of investors mentality and behavior factors is Investor Sentiment (Investor Sentiment)[5]. The definition of investors sentiment has different forms, Brown and Cliff (2004) argued that investors sentiment can be defined as investors overall optimistic or pessimistic mood for stocks[6]. Barker and Wurgler (2006) argued that investors sentiment can be defined as investors speculative trend[2], further study of investors sentiment theory can improve the ability of asset pricing theory to explain the stock market. Behavioral finance is a branch of behavioral economics, which is based on the experimental and psychological research in economics, mainly studies market effectiveness which caused by investors in the investment decision-making and in the process of cognition, emotion, attitude and so on, psychological characteristics, corrects the argument of rational man hypothesis and points out that due to the deviation of cognitive processes and emotions, preferences, and psychological aspects of reasons cause investors

unable to rational decision-making[7]. From the Angle of investor sentiment to study asset pricing, therefore, studying the effect of investor sentiment on the asset pricing is of great significance.

SAMPLES SELECTION

The earliest insurance companies of China which have listed include China life, ping an, China Pacific, Xinhua insurance, due to the time to market of different insurance companies inconsistency and unable to search some data in the database, so this paper mainly studies China life insurance company, the earliest listed company. All stock trading data of China life insurance company are taken as samples, the period of the samples is between April 2011 and December 2011, a total of 33 months.

Investors sentiment as an important factor to influence stock market volatility, there have been more mature abroad research conclusions, but the index of sentiment abroad or through direct investigation data, or using the options and the quantification methods for index, these methods are not feasible in the domestic market now. According to the measuring methods of investors' emotion and nature of the classification, investors' sentiment index can be divided into direct investor sentiment index and indirect investor sentiment index. Direct investor sentiment index by way of questionnaire to understand investors' perception of the market, through the bullish, bearish and looking flat rate data to measure can directly response investors optimistic, pessimistic view to the market. Indirect investor sentiment index refers to the public statistics through market transactions, such as market turnover rate, dividend yield, price-earnings ratio, IPO issuance and trading yields, market volatility index to measure indirectly[8,9]. Domestic scholars used direct sentiment indicators including a program named CCTV Kanpan[10], the consumer confidence index, etc. Indirect sentiment indicators include closed-end funds allowance for depreciation, IPO first-day returns, new investors' accounts[10,11]. Direct investor sentiment indicators is easy to have representative sample selection problems, the content of distortion and other issues, such as investors duplicity is easy to make the emotion index content distortion[4]; however, making use of market public statistical data can accurately measure investor sentiment index, because the market data is what investors actually do rather than what they want to do. Based on the above analysis, indirect sentiment indicators will be quantified mainly through market data collection.

TABLE 1 : Metric names and definitions

Quantitative Indicators	Definition
Dividend Yield	Dividend/stock purchase price
Turnover Rate	Also known as "velocity", refers to in a certain time in the market shares changed hands trading frequency, is one of the indicators reflect the stock liquidity strong or weak
P/E Ratio	The stock's closing price/earnings per share, p/e ratio is the most commonly used to assess whether reasonable stock level indicator
Yield	Yield is the return on an investment, expressed as a percentage of the annual, according to the current market price, face value, coupon rate and expiration time calculation
Closing Price	A unit of month to study closing price

The dividend yield data in this thesis from China securities index, data is a month for the unit to calculate statistics, stock market P/E ratio, yield, and the closing price data of the stocks are all from Royce database, time variable are introduced in the model as explanatory variables.

Using least squares method to establish model, monthly closing price of China life are taken as depended variables Y, and the average dividend yields of the stocks are taken as explanatory variables X1, monthly average turnover rates of the stocks are taken as explanatory variables X2, monthly average p/e ratios of the stocks are taken as explanatory variables X3, monthly average yields of the stocks are taken as explanatory variables X4, and time variable are introduced as explanatory variables t.

MODEL BUILDING

By using the least squares method to establish the model, the model shown below:

Dependent Variable: EXP(Y)
Method: Least Squares
Date: 04/16/14 Time: 15:03
Sample: 2011M04 2013M12
Included observations: 33

	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.24E+09	2.60E+08	-4.759959	0.0001
X2	1.65E+10	5.60E+09	2.943476	0.0066
EXP(X3)	6.03E+08	1.56E+08	3.869227	0.0006
X4^4	3.44E+11	1.09E+11	3.144871	0.0040
X4^5	1.77E+12	5.40E+11	3.284556	0.0028
LOG(T*X1)	-1.78E+08	42888713	-4.157047	0.0003

R-squared	0.871678	Mean dependent var	1.57E+08
Adjusted R-squared	0.847915	S.D. dependent var	3.74E+08
S.E. of regression	1.46E+08	Akaike info criterion	40.59727
Sum squared resid	5.74E+17	Schwarz criterion	40.86936
Log likelihood	-663.8550	Hannan-Quinn criter.	40.68882
F-statistic	36.68174	Durbin-Watson stat	2.098630

Figure1 : Result of the regression analysis

Model expression is:

Exp (Y) = -1239458531.11 - 178290397.216*log (T*X1) +16485352773.6*X2 + 602816757.057*exp

(X3) + 343709104293*X4^4 + 1773383246110*X4^5

R^2=0.872 DW=2.099 F=36.682 T=33

The commonly used method of Heteroscedasticity inspection is White, the principle of White inspection is: through a auxiliary regression statistics χ^2 to construct Heteroscedasticity Testing, if TR^2 $\leq \chi^2(n)$, u_t, the model has the same variance; if TR^2$\leq \chi^2(n)$, u_t, the model has Heteroscedasticity, T is the sample size, R ^ 2 is auxiliary regression coefficient of the OLS estimates which can be determined, the degrees of freedom n is the number of the explanatory variable in auxiliary regression type. Inspection results are as follows:

Heteroskedasticity Test: White

F-statistic	5.057680	Prob. F(20,12)	0.0030
Obs*R-squared	29.50033	Prob. Chi-Square(20)	0.0784
Scaled explained SS	53.86721	Prob. Chi-Square(20)	0.0001

Figure2 : Heteroscedasticity Test; Probe=0.0784> α (α =0.05), Model through the inspection, there is no heteroscedasticity.

The second premise condition which must be satisfied is the random error term u_t has not Autocorrelation. Therefore, the second step need to be done is autocorrelation test, the most commonly using method of autocorrelation test is the DW test and LM test, DW inspection only applies to first order autocorrelation, LM inspection applies to not only first order autocorrelation but also higher order autocorrelation. Test results as shown in the figure below:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.109842	Prob. F(1,26)	0.7430
Obs*R-squared	0.138828	Prob. Chi-Square(1)	0.7094

Figure 3 : Autocorrelation Test; Probe=0.7094> α (α =0.05). Test results show that the model through the inspection, there is no autocorrelation.

Klein discriminate method: to observe correlation coefficients r of the explanatory variables x1, x2, x3, x4, if there is a certain | r | >R ^ 2, the multicollinearity between χ_i and χ_j is harmful. Model output is:

Correlation

	X1	X2	X3	X4
X1	1.000000	-0.302570	-0.483250	-0.105573
X2	-0.302570	1.000000	0.033510	0.019799
X3	-0.483250	0.033510	1.000000	0.153601
X4	-0.105573	0.019799	0.153601	1.000000

Figure 4 : Coefficient test; R^2=0.87, there is no | r | >R ^ 2, the conclusion is: there is no multicollinearity between explanatory variables.

RESULT AND DISSCUSS

Using the least squares method to establish a model of expression, we can see variables X1 dividend rate, P/e ratio X2, yields X3, turnover rate X4 all influence the closing prices of the stocks. Through a simple scatter plot we can see that the dependent variables Y and t * explanatory variables X1 (dividend rate) has a logarithmic relationship and is a negative correlation; dependent variables Y and the explanatory variables X2 (turnover) has a positive correlation, the higher the closing price of the higher turnover; dependent variables Y and explanatory variables X3 (p/e ratio) has a positive correlation with exponential relationship; dependent variable Y and the explanatory variables X4 (yield) has a positive correlation. Model test results show that the model does not have heteroscedasticity, Non-self-correlation and there is no multicollinearity between the explanatory variables, this model through testing. Final conclusion can be drawn: investors' emotions affect the pricing of the stocks of the insurance industry.

CONCLUSIONS

The stock market of China as an emerging market, all kinds of systems are not perfect, while the prevalence of speculation which determines the stock market of China has stronger psychological characteristics. Therefore, this paper put the focus on the effect of investor sentiment on the stock market. In this paper, from April 2011 to December 2013, the trading data of China Life stocks are taken as samples, by the quantitative analysis of indicators, the sentiment has been measured objectively and indirectly, and the emotional impact on the capital asset pricing has been examined. The effect of the

sentiment on asset pricing has been demonstrated; meanwhile this paper provides a new clue for sentiment as an important factor on affecting asset pricing. This model introduces time t as explanatory variables, and further illustrates the effect of time on asset pricing. The result has a positive significance for investors to take advantage of the sentiment which cause asset pricing deviation to obtain additional benefits and for the portfolio and the optimization of dynamic asset allocation. The potential significance of the conclusions is that the government should focus on market bubble or irrational exuberance and guide investors to rational invest to ensure the healthy and stable development of capital market.

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