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Does Investor Sentiment affect Stock Return: Evidence from Chinese Industry Index in Shanghai A Share Market

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Abstract

In stock market, some of characteristics of asset pricing behavior of traditional financial theory didn't work, behavioral finance otherwise provides a new method and aspect to interpret these visions. Investor behavior which is influenced by investor sentiment plays an important role in stock market, irrational behavior may lead to market inefficiency, and stock return is a reflection of the market condition, hence studying the effects of investor sentiment on stock return is meaningful. This paper mainly studied investor sentiment whether and how affects stock return, as well as applied other six control variables a share market stock return, Dow Jones Industrials index return, interest rate, exchange rate, crude oil price and gold price which could affect stock return in previous studies. To detect the effects this paper first investigate bullish investor sentiment and then applied multiple regression linear model to find investor sentiment positive significantly affects stock return in nine industries. This study provided a new perspective to explore the characteristics between investor sentiment and stock return, also presented new ideas for investors' investment practices in stock market.

Keywords

Investor Sentiment; Stock Return; Regression Model.

1. INTRODUCTION

This paper analyzes the influencing factors of the stock return from the aspects of interest rate, crude oil price, gold price, RMB exchange rate, A Share index return, DJIA (Dow Jones Industrial Average) index return and investor sentiment, divides the paper into five parts by referring to the relevant research results, analyzing and improving the problems existing in the research.

To study the industry index stock return and investor sentiment is important and necessary for investors and authority to adjust their strategy and policy and also provide a preview about economy current situation.

2. LITERATURE REVIEW

About the supply and demand theory, when demand is greater than supply, the price will increase, when demand is less than supply, the price will decrease. Under normal circumstance, the goods price is going up while the demand of this goods decrease, and vice versa. Based on this theory, assuming that other factors unchanged, the stock price index increase, the demand will decrease; contrarily when the stock index decrease describes that securities supply decrease and demand in market increase.

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Modern investment theory first proposed by Harry.M.Markowitz (1952) in the book Portfolio Selection, modern investment theory is main composite of portfolio theory, CAPM, APT and EMH. The investment theory measures the return and risk with mean and variance formula, it provides an important ideology basis and build a practical analysis system for valid portfolio.

CAPM put forward by William Sharp and J.Lintner in 1965, this theory suggests that the required rate of return for an investment depends on the following three elements: riskfree return rate, such as treasury bonds and bank deposits, market average return rate and portfolio risk coefficient β. CAPM shows the relationship between portfolio required return and degree of risk, it helps investors evaluate rationality of listing securities and predict the expect return with the standard derivation calculating quantitative relationship. However, CAPM requires stringent hypothesis and conditions in theory, normally results are not match the empirical obtaining and reality

EMH is developed by Samanelson and Eugene Fama in 1965, this theory divided three variants of hypothesis based on the security price response to strength of the market information. In the case of a weak and efficient market, it can be assumed that all investors participating in the transaction have mastered the historical price movements of a particular security, all investors on the collective judgment of these information formed the price of this particular securities.

3. POPULATION

The sample of this study are nine industry index stocks return (Oil & Gas, Basic Material, Industrials, Consumer Goods, Health Care, Consumer Services, Utilities, Financials and Technology industrials), and A-share index return from Shanghai Stock Exchange market, DJIA (Dow Jones Industrial Average) index return from S&P Dow Jones Indices, crude oil WTI (West Texas Intermediate) Cushing U$/BBL price from Marcrotrends, Gold Bullion LBM (London Bullion Market) U$/Troy Ounce price from The London BullionMarket, exchange rate interbank offered rate, China Interbank Shanghai Middle interest rate from PBOC and bullish sentiment numbers from Jan 1, 2010 to Dec 30, 2016 by daily data.

3.1. Data Collection

Data used in this paper was collected from difference sources, including national and foreign data. Data source searching and applied in this study, as using dynamic data statistic, so about SHA index, DJI index and industry index, investigate the formula to calculate returns:

-RDJ = (IDJt - IDJt-1) / IDJt-1 *100%

-RSHA = (ISHAt - ISHAt-1) / ISHAt-1 *100%

-RIND = (IINDt - IINDt-1) / IINDt-1 *100%

-RDJ, RSHA, RIND: Dow Jones Industrial Index Return, A-Share Index Return, Industry Index Return.

-RDJ, RSHA, RIND: Dow Jones Industrial Index Return, A-Share Index Return, Industry Index Return.

-t: time daily

-IDJ, ISHA, IIND: Dow Jones Industrial Index, A-Share Index, Industry Index.

For bullish sentiment, investigate the rise, fall and unchanged sentiment changes to calculate as following:

-Bullish Sentiment = Numbers of rise / (Numbers of rise + Numbers of fall + Numbers of unchanged) * 100%

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3.2. Data Model

This research built a regression model based on the above variables. By using multiple regression analysis and various detections, identify which and how influence variables affect industry index stock return.

According the factors affecting the stock return and the purpose of this study, the multiple linear regression model can be described as follows:

$RIN1t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sent + \mu$

$RIN2t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sen2t + \mu$

$RIN3t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sen3t + \mu$

$RIN4t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sen4t + \mu$

$RIN5t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sen5t + \mu$

$RIN6t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sen6t + \mu$

$RIN7t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sen7t + \mu$

$RIN8t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sen8t + \mu$

$RIN9t = \alpha + \beta1RSHAt + \beta2RDJIt\text{-}1 + \beta3Intt + \beta4Exct + \beta5Oilt + \beta6Goldt + \beta7Sen9t + \mu$

Dependent and Independent variables:

-RIN1t~RIN9t each represents returns of nine industry (Oil&Gas, Basic Materials,

Industrials, Consumer Goods, Health Care, Consumer Service, Utilities, Financials and Technology).

-Sen1t~Sen9t each represent the nine industry bullish sentiment.

-RSHAt, RDJIt-1, Intt, Exct, Oilt, Goldt: SHA index return, DJI index return, interest rate, exchange rate, oil price and gold price.

-α: Intercept

-βi: Regression coefficient;

and then to avoid multicollinearity among IV(independent variables), we conduct correlation analysis to test if correlation coefficient greater than 0.8.

-μ: random error

4. DATA ANALYSIS

4.1. The Descriptive Statistics Results in Nine Industries

Table 1. Descriptive Statistics of Nine Industry Index in A-Share Market

Industry	N	Minimum	Maximum	Mean	Std.Deviation
OILGSS	2041	121.210	255.580	159.914	29.175
BMATR	2041	451.780	1309.210	761.204	215.561
INDUS	2041	292.260	1005.700	455.313	120.356
CNSMG	2041	135.320	302.380	183.710	28.947
HLTHC	2041	401.770	1236.160	700.965	173.335
CNSMS	2041	517.990	1943.970	915.750	243.499
UTILS	2041	245.520	758.660	361.196	92.7000
FINAN	2041	1698.400	4090.840	2398.216	495.229
TECNO	2041	173.130	942.010	361.868	113.569

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This chapter described empirical results of the factors affecting stock return in each of nine industries adopted the daily data for the dependent variable, six control independent variables (A-Share market stock return, Dow Jones Industrials Index stock return, interest rate, exchange rate, crude oil price and gold price) and bullish investor sentiment during Jan 1, 2010 to Dec 30, 2016 to test the description of regression to define the effects between independent variables and dependent variables.

Descriptive statistics is to describe frequency and basic data observation. It mainly includes the frequency analysis of minimum, maximum, mean and deviation data to quantify the amount of variation and dispersion of set values.

Table 2. Descriptive Statistics of Nine Bullish Sentiments

Industry	N	Minimum	Maximum	Mean	Std.Deviation
SEN1	2041	0.000	100.000	43.644	32.588
SEN2	2041	0.000	100.000	43.313	30.644
SEN3	2041	0.000	100.000	43.518	28.088
SEN4	2041	0.000	100.000	44.313	27.200
SEN5	2041	0.000	100.000	44.772	28.682
SEN6	2041	0.000	100.000	43.335	28.741
SEN7	2041	0.000	100.000	43.112	31.560
SEN8	2041	0.000	100.000	43.184	31.039
SEN9	2041	0.000	100.000	44.584	29.510

Table 3. Descriptive Statistics of Six Control Variables

variable	N	Minimum	Maximum	Mean	Std. Deviation
SSEA	2041	2040.674	5410.859	2878.425	597.903
DJII	2041	9686.480	23441.537	15390.537	3297.039
IR	2041	1.027	13.444	2.587	0.991
ER	2041	6.039	6.970	6.438	0.257
OIL	2041	26.19	113.39	75.656	23.526
GOLD	2041	1051.97	1898.25	1353.025	195.828

Table 4. Descriptive Statistics of Nine Industries Return

Industry	N	Minimum	Maximum	Mean	Std.Deviation
RIND1	2041	-9.808	9.527	-0.017	1.435
RIND2	2041	-8.762	7.442	-0.013	1.767
RIND3	2041	-8.947	7.438	0.021	1.617
RIND4	2041	-10.457	7.863	0.032	1.476
RIND5	2041	-8.055	7.395	0.043	1.507
RIND6	2041	-9.053	7.401	0.012	1.702
RIND7	2041	-8.487	7.361	0.008	1.463
RIND8	2041	-9.577	7.305	0.013	1.447
RIND9	2041	-9.137	7.170	0.035	1.939

From the table 3 to table 4 we get to know that the minimum and maximum index number of SSEA is 2040.6740 and 5410.8590 in these six year, and the mean is 2878.4245, the minimum and maximum number of DJII is 9686.48 and 23441.76, and the mean is 15390.54. The interest

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rate of middle rate china interbank, minimum and maximum numbers are 1.0270 and 13.444, the mean is 2.587. The exchange rate Chinese yuan to dollar minimum is 6.0390 (￥/$) and maximum is 6.9704 (￥/$). The crude oil price of WTI (West Texas Intermediate) maximum number is 113.39 ($/bbl) and minimum number is 26.19($/ bbl). About gold price of London Bullion Market, the maximum number is 1898.25 ($/ ounce), and the minimum number is 1051.97 ($/ounce). From the bullish sentiment table, the mean of SEN7 is the lowest number 43.1120, and SEN5 is the highest number 44.7714. And from return of industry table we clearly get that the mean number of RIN5 is the highest 0.0430 and lowest is RIN1-0.0166.

To exhibit the basic statistics of stock return in nine industries , six control variables and investor sentiment such as standard deviation, mean , maximum and minimum number in order to understand and compare the data to each industry.

Table 5. Descriptive Statistics of Testing Data in Nine Industries

Variables	N	Minimum	Maximum	Mean	Std.Deviation
RIND1	2041	-9.808	9.527	-0.017	1.435
RIND2	2041	-8.762	7.442	-0.013	1.767
RIND3	2041	-8.947	7.438	0.021	1.617
RIND4	2041	-10.457	7.863	0.032	1.476
RIND5	2041	-8.055	7.395	0.043	1.507
RIND6	2041	-9.053	7.401	0.012	1.702
RIND7	2041	-8.487	7.361	0.008	1.463
RIND8	2041	-9.577	7.305	0.013	1.447
RIND9	2041	-9.137	7.170	0.035	1.939
RCHN	2041	2040.674	5410.859	2878.425	597.903
RUSA	2041	9686.480	23441.760	15390.537	3297.039
IR	2041	1.027	13.444	2.587	0.991
ER	2041	6.039	6.970	6.438	0.258
OIL	2041	26.190	113.390	75.656	23.526
GOLD	2041	1051.970	1898.250	1353.025	195.829
SEN1	2041	0.000	100.000	43.644	32.588
SEN2	2041	0.000	100.000	43.313	30.644
SEN3	2041	0.000	100.000	43.518	28.088
SEN4	2041	0.000	100.000	44.313	27.200
SEN5	2041	0.000	100.000	44.772	28.682
SEN6	2041	0.000	100.000	43.335	28.741
SEN7	2041	0.000	100.000	43.112	31.560
SEN8	2041	0.000	100.000	43.184	31.039
SEN9	2041	0.000	100.000	44.584	29.510

The table output shows the descriptive statistics of seven independent variables and one dependent variable based on daily data in nine industries. There are 2041 valid observations. The average of RIND1 is -0.0166 and the standard deviation is 1.4354, the maximum is 9.5270 and the minimum is -9.808. The mean of RIND2 is -0.0127, the standard deviation is 1.7666, the maximum is 7.4420 and the minimum is -8.4880. The mean of RIND3 is -0.0208, the standard deviation is 1.6165, the maximum is 7.4380 and the minimum is -8.9470. The mean of RIND4 is -0.0321, the standard deviation is 1.4764, the maximum is 7.8630 and the minimum is -10.4570. The mean of RIND5 is 0.4298, the standard deviation is 1.5071, the maximum is 7.3950 and the minimum is -8.0550. The mean of RIND6 is 0.0118, the standard deviation is

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1.7024, the maximum is 7.4010 and the minimum is -9.0530. The mean of RIND7 is 0.0085, the standard deviation is 1.4630, the maximum is 7.3610 and the minimum is -8.4870. The mean of RIND8 is 0.0132, the standard deviation is 1.4467, the maximum is 7.3050 and the minimum is -9.5770. The mean of RIND9 is 0.3471, the standard deviation is 1.9385, the maximum is 7.1700 and the minimum is -9.1370.

The mean of control variable RCHN is 0.0114, the standard deviation is 1.3553, the maximum is 5.7590 and the minimum is -8.488. For number of RUSA the average is 0.0432, the standard deviation is 0.8554, and the highest number is 4.2410, the lowest number is -5.546. The mean of IR is 2.5873, the standard deviation is 0.9913, the maximum is 13.444 and the minimum is 1.027. For number of ER the average number is 6.4377, the standard deviation is 0.2574, the maximum is 6.970 and the minimum is 6.039. The Oil mean is 75.6558, and the standard deviation is 23.5259, the maximum is 113.39 and the minimum is 26.19. The Gold average number is 1353.0248, the standard deviation is 195.8280, the maximum is 1898.25 and the minimum is 1051.97. For the mean of SEN1 is 43.6441, SEN2 is 43.3132, SEN3 is 43.5182, SEN4 is 44.3172, SEN5 is 44.7714, SEN6 is 43.3349, SEN7 is 43.1120, SEN8 is 43.1814 and SEN9 is 44.5844. And the standard deviation of SEN1 is 32.5875, SEN2 is 30.6440, SEN3 is 28.0880, SEN4 is 27.1996, SEN5 is 28.6819, SEN6 is 28.7411, SEN7 is 31.5602, SEN8 is 31.0387 and SEN9 is 29.5102, the maximum is 100 and the minimum is 0.

4.2. Autocorrelation Test in Nine Industries

The Durbin Watson Test is a measure of autocorrelation in residuals from regression analysis. Durbin and Watson (1950, 1951) applied this statistic to the residuals from least squares regressions, and developed bounds tests for the null hypothesis that the errors are serially uncorrelated against the alternative that they follow a first order autoregressive process. Autocorrelation is the similarity of a time series over successive time intervals. It could lead to underestimates of the standard error and can cause predictors are significant when they are not. The Durbin Watson test reports a test statistic, calculated is outside the lower limit (dL) and the upper limit (dV), then the model is not autocorrelation, with a value from 0 to 4, where: 2 is no autocorrelation, 0 < DW < 2 is positive autocorrelation (common in time series data), DW > 2 to 4 is negative autocorrelation (less common in time series data). In the range of 1.5 to 2.5 are relatively considered normal (Ghozali, 2007). Values outside of this range could be cause for concern.

Table 6. R Square and D-W Test in Nine Industries

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig.	Dubin-Watson
1	0.772a	0.596	0.595	0.913	0.000b	1.978
2	0.929a	0.864	0.863	0.653	0.000b	1.835
3	0.941a	0.886	0.886	0.547	0.000b	1.831
4	0.898a	0.806	0.805	0.652	0.000b	1.719
5	0.866a	0.749	0.749	0.756	0.000b	1.574
6	0.900a	0.809	0.809	0.745	0.000b	1.750
7	0.881a	0.775	0.775	0.694	0.000b	1.921
8	0.883a	0.779	0.778	0.681	0.000b	1.880
9	0.861a	0.741	0.740	0.988	0.000b	1.603

From the table output the results show that all models are 1.5 < D - W < 2, there present no serial correlation problems. For model 1 adjusted R2 is at 0.595, showing that equation could explain the changes of Oil&Gas industry stock return by 59.5% (Cohen, J. 2003). For model 2 adjusted R2 is at 0.863 showing that equation could interpret the changes of stock return in Basic Materials industry by 86.3%. For model 3 adjusted R2 is at 0.886, showing that equation

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could explain the changes of stock return in Industrials by 88.6%. For model 4 adjusted R2 is at 0.805 showing that equation could explain the changes of stock return in Consumer Goods industry by 80.5%. For model 5, adjusted R2 is at 0.749, showing that equation could explain the changes of stock return in Health Care industry by 74.9%. For model 6 adjusted R2 is at 0.809, showing that equation could explain the changes of stock return in consumer service industry by 80.9%. For model 7 adjusted R2 is at 0.775, showing that equation could explain the changes of stock return in Utilities industry by 77.5%. For model 8 adjusted R2 is at 0.778, showing that equation could explain the changes of stock return in Financials by 77.8%. For model 9 adjusted R2 is at 0.740, showing that equation could explain the change of stock return in Technology industry by 74.0%. The minimum adjusted R2 is at 0.595 in Oil&Gas industry, and maximum adjusted R2 is at 0.886 in Industrials.

4.3. Normality Test in Nine Industries

Normality test: is used to determine whether or not the normal distribution of data (Santoso, 2010). Good research data is data that has a normal distribution. The normal distribution (bell shaped) means the data has spread evenly so that it can represent the population. Data that is not normal could be distinguished from the level of skewed. If the data tends to be skewed to the left is called positive skewness, if the data tend to be skewed to the right is called negative skewness, and the data is said to be normal if the data is symmetrical.

The Kolmogorov-Smirnov test (Chakravart, Laha, and Roy, 1967) is an empirical distribution function in which the theoretical cumulative distribution function tests for normality calculate the probability that the sample was drawn from a normal population, in the model normality of residual test was applied. The hypotheses used are: Ho: The sample data are not significantly different than a normal population, Ha: The sample data are significantly different than a normal population. So when testing for normality, if probabilities > 0.05 mean the data are normal, probabilities < 0.05 mean the data are not normal.

The graph test in SPSS is P-P plot, if the data follow a normal distribution with mean and variance, then a plot of the theoretical percentiles of the normal distribution versus the observed sample percentiles should be approximately linear, if the data is not normal, the little circles will not follow the normality line, there is a little bit of deviation, but could still be accepted, if there are no drastic deviations, we could conclude normality in the model.

Table 7. The K-S Normality Test In Nine Industries

		Kolmogorov-Smimova			Shapiro-Wilk		
Model	Residual	Statistic	N	Sig.	Statistic	N	Sig.
1	Unstandardized Residual	0.152	2041	0.000	0.790	2041	0.000
	Standardized Residual	0.152	2041	0.000	0.790	2041	0.000
2	Unstandardized Residual	0.058	2041	0.000	0.952	2041	0.000
	Standardized Residual	0.058	2041	0.000	0.952	2041	0.000
3	Unstandardized Residual	0.081	2041	0.000	0.929	2041	0.000
	Standardized Residual	0.081	2041	0.000	0.929	2041	0.000
4	Unstandardized Residual	0.037	2041	0.000	0.969	2041	0.000
	Standardized Residual	0.037	2041	0.000	0.969	2041	0.000
5	Unstandardized Residual	0.070	2041	0.000	0.952	2041	0.000
	Standardized Residual	0.070	2041	0.000	0.952	2041	0.000
6	Unstandardized Residual	0.058	2041	0.000	0.957	2041	0.000
	Standardized Residual	0.058	2041	0.000	0.957	2041	0.000
7	Unstandardized Residual	0.096	2041	0.000	0.897	2041	0.000
	Standardized Residual	0.096	2041	0.000	0.897	2041	0.000
8	Unstandardized Residual	0.101	2041	0.000	0.910	2041	0.000
	Standardized Residual	0.101	2041	0.000	0.910	2041	0.000
9	Unstandardized Residual	0.056	2041	0.000	0.969	2041	0.000
	Standardized Residual	0.056	2041	0.000	0.969	2041	0.000

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From the K-S test output all Sig. values of normal of residuals are all < 0.05, showing there have no normal distribution in each model, but the most serious limitation for K-S test is that the distribution must be fully specified, that is, if location, scale, and shape parameters are estimated from the data, the critical region of the K-S test is no longer valid, its high sensitivity to extreme values, it typically must be determined by simulation. So we also use graphic P-P plot test the normality, graph test applied in next step.

4.4. Heteroscedasticity Test in Nine Industries

Heteroscedasticity means unequal scatter, in regression analysis, heteroscedasticity is tested in the context of the residuals or error term. Specifically, heteroscedasticity is a systematic change in the spread of the residuals over the range of measured values. Heteroscedasticity is a problem because ordinary least squares (OLS) regression assumes that all residuals are drawn from a population that has a constant variance (homoscedasticity). To satisfy the regression assumptions and be able to trust the results, the residuals should have a constant variance.

Table 8. Glejser Heteroscedasticity Test From Industries 1 to Industry 5

Model	Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.
1	(CONSTANT)	5.678	0.487		11.667	0.000
	RCHN	-0.128	0.015	-0.236	-8.314	0.000
	RUSA	-0.004	0.018	-0.005	-0.216	0.829
	IR	-0.054	0.017	-0.074	-3.174	0.002
	ER	-0.653	0.069	-0.230	-9.466	0.000
	OIL	-0.005	0.001	-0.150	-5.366	0.000
	GOLD	0.000	0.000	-0.129	-4.977	0.000
	SEN1	0.005	0.001	0.221	7.791	0.000
2	(CONSTANT)	2.518	0.307		8.195	0.000
	RCHN	0.049	0.010	0.148	4.798	0.000
	RUSA	-0.005	0.011	-0.009	-0.423	0.672
	IR	-0.016	0.011	-0.036	-1.493	0.136
	ER	-0.234	0.044	-0.135	-5.376	0.000
	OIL	-0.003	0.001	-0.133	-4.609	0.000
	GOLD	0.000	0.000	-0.084	-3.120	0.002
	SEN2	-0.001	0.000	-0.072	-2.343	0.019
3	(CONSTANT)	3.190	0.264		12.036	0.000
	RCHN	0.028	0.009	0.097	3.115	0.002
	RUSA	-0.005	0.010	-0.011	-0.505	0.614
	IR	-0.023	0.009	-0.057	-2.427	0.015
	ER	-0.341	0.037	-0.225	-9.112	0.000
	OIL	-0.002	0.000	-0.140	-4.918	0.000
	GOLD	0.000	0.000	-0.129	-4.884	0.000
	SEN3	-0.001	0.000	-0.049	-1.590	0.112
4	(CONSTANT)	1.724	0.301		5.726	0.000
	RCHN	0.021	0.010	0.066	2.114	0.035
	RUSA	0.007	0.011	0.014	0.643	0.520
	IR	-0.022	0.011	-0.050	-2.067	0.039
	ER	-0.159	0.043	-0.095	-3.741	0.000
	OIL	-0.001	0.001	-0.055	-1.867	0.062
	GOLD	-4.324	0.000	-0.002	-0.072	0.942
	SEN4	-0.002	0.000	-0.103	-3.339	0.001
5	(CONSTANT)	2.120	0.366		5.795	0.000
	RCHN	0.043	0.011	0.110	4.001	0.000
	RUSA	-0.019	0.014	-0.031	-1.407	0.159
	IR	-0.027	0.013	-0.050	-2.098	0.037
	ER	-0.163	0.052	-0.079	-3.135	0.002
	OIL	0.001	0.001	0.035	1.201	0.230
	GOLD	0.000	0.000	-0.103	-3.829	0.000
	SEN5	-0.003	0.000	-0.179	-6.589	0.000

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Heteroscedasticity test is to detect the presence or absence of heteroskedastistitas in one data, the regression model to be good if there is not heteroscedasticity (Ghozali, 2007). Heteroscedasticity testing can be done by Glejser Test (Glejser 1969) method. Glejser test is conducted by regression between independent variable and absolute residual as dependent variable.

The result value of test could be seen from value of significant. If the significance value > 0.05, then there is no heteroscedasticity. Conversely, if the significance value < 0.05, then occurs heteroscedasticity (Hill, Griffiths and Lim, 2011). In SPSS the graph test principle is to see the scatterplot between the predictive value of the independent variable that is ZPRED with the residue of SRESID. If there is a particular pattern in the SPSS scatterplot graph like regular pattern, it could be concluded that there has a problem of heteroscedasticity problem. Conversely, if there is no clear pattern, and dots are spreading, then the indication is no heteroscedasticity.

Table 9. Glejser Heteroscedasticity Test From Industries 6 to Industry 9

Model	Variables	Unstandardized Beta	Coefficients Std. Error		Standardized coefficients Beta	t	Sig.
6	(CONSTANT)	4.049	0.346		11.686		0.000
	RCHN	0.008	0.011	0.020	0.688		0.492
	RUSA	-0.015	0.013	-0.024	-1.129		0.259
	IR	-0.012	0.012	-0.023	-0.994		0.320
	ER	-0.398	0.049	-0.200	-8.109		0.000
	OIL	-9.927	0.001	-0.005	-0.160		0.873
	GOLD	-0.001	0.000	-0.235	-8.887		0.000
	SEN6	-0.002	0.001	-0.099	-3.441		0.001
7	(CONSTANT)	3.633	0.345		10.527		0.000
	RCHN	-0.065	0.011	-0.173	-5.788		0.000
	RUSA	-0.009	0.013	-0.015	-0.690		0.490
	IR	-0.040	0.012	-0.077	-3.267		0.001
	ER	-0.454	0.049	-0.230	-9.321		0.000
	OIL	-0.003	0.001	-0.137	-4.813		0.000
	GOLD	-4.767	0.000	-0.018	-0.696		0.487
	SEN7	0.004	0.000	0.222	7.465		0.000
8	(CONSTANT)	4.425	0.330		13.398		0.000
	RCHN	-0.012	0.011	-0.033	-1.118		0.264
	RUSA	-0.017	0.012	-0.030	-1.395		0.163
	IR	-0.031	0.012	-0.063	-2.693		0.007
	ER	-0.506	0.047	-0.263	-10.822		0.000
	OIL	-0.004	0.001	-0.191	-6.813		0.000
	GOLD	0.000	0.000	-0.123	-4.729		0.000
	SEN8	0.002	0.000	0.148	5.009		0.000
9	(CONSTANT)	6.076	0.451		13.469		0.000
	RCHN	0.052	0.013	0.140	3.974		0.000
	RUSA	0.015	0.017	0.019	0.879		0.379
	IR	-0.032	0.016	-0.047	-2.011		0.045
	ER	-0.650	0.064	-0.248	-10.171		0.000
	OIL	-0.004	0.001	-0.124	-4.391		0.000
	GOLD	0.000	0.000	-0.131	-5.012		0.000
	SEN9	-0.005	0.001	-0.208	-7.987		0.000

From table 8-table 9, in model 1 based on output coefficients the obtained value of Sig. RUSA variable of 0.829 > 0.05, but other Sig. value of variables are all < 0.05, it could be concluded that there is heteroscedasticity problem. In model 2 the Sig. value of RUSA is at 0.672 > 0.05 and

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the value of IR is at 0.136 > 0.05, other value of variables are < 0.05 showing heteroscedasticity problem. In model 3 the Sig. value of RUSA is at 0.614 > 0.05, and value of SEN3 is at 0.112 > 0.05, other value of variables are < 0.05, presenting heteroscedasticity problem. In model 4, the Sig. value of RUSA is at 0.520 > 0.05, the value of GOLD is at 0.942 > 0.05, other value of variables are < 0.005, showing heteroscadasticity problem. In model 5 the Sig. value of RUSA is at 0.159 > 0.05, and the value of OIL is at 0.230, other values of variables are < 0.05 showing heteroscedasticity problem. In model 6 the Sig. value of RCHN is at 0.492 > 0.05, RUSA is at 0.259 > 0.05, IR is at 0.320 > 0.05 and OIL is at 0.873 > 0.05, other values of variables are < 0.05, also presenting the heteroscedasticity problem. In model 7 the Sig. value of RUSA is at 0.490 > 0.05 and GOLD is at 0.487 > 0,05, other values of variables are < 0.05 showing the heteroscedasticity problem. In model 8 the Sig. value of RCHN is at 0.264 > 0.05, RUSA is at 0.163 > 0.05, other values of variables are < 0.05, showing the heteroscadasticity problem. In model 9 just the Sig. value of RUSA is at 0.379 > 0.05, all other values of variables are < 0.05, so concluding that there is heteroscadasticity problem in the model.

Continue to investigate graph test for heteroscedasticity problem in nine industries:

Based on the scatterplot output above, it appears that the spots are diffused and do not form a clear specific pattern. So it could be accepted that the regression model does not occur heteroscedasticity problem (Ghozali, Imam. 2007).

4.5. Multicollinearity Test and Regression Interpretation

Multicollinearity test is to be used to examine the correlation between different independent variables, if a linear regression model has multicollinearity will cause test and result inaccurately.

The variance inflation factor VIF (Nachrowi , 2006) is the ratio quantifies the severity of multicollinearity in an ordinary least squares regression analysis, the general rule of thumb is that VIFs exceeding 4 warrant further investigation, while VIF is exceeding 10 are signs of serious multicollinearity requiring correction Nur Ainiyah (2016).

Table 10. The Regression Results in Oil&Gas Industry and Multicollinearity Test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collinearity Tolerance	Statistics VIF
(CONSTANT)	-0.588	0.642		-0.915	0.360		
RCHN	-0.745	0.020	0.704	36.817	0.000	0.543	1.840
RUSA	0.057	0.024	0.034	2.381	0.017	0.973	1.028
IR	0.010	0.023	0.007	0.444	0.657	0.814	1.228
ER	0.043	0.091	0.008	0.471	0.638	0.745	1.342
OIL	-8.700	0.001	0.000	-0.008	0.994	0.561	1.782
GOLD	6.481	0.000	0.009	0.507	0.612	0.652	1.543
SEN1	0.004	0.001	0.089	4.686	0.000	0.548	7.824

From the Oil&Gas industry test table output results summarize the regression formula:

RIND1t = -0.588 - 0.745RSHAt + 0.057RDJIt-1 + 0.004Sen1t

The variables statistics VIF are all < 5, so there is no multicollinearity between independents, and about significance IR is at 0.675 > 0.05, ER is at 0.638 > 0.05, OIL is at 0.994 > 0.05 and GOLD is at 0.612 > 0.05, so these four independents have no Sig. effects on dependent. A-Share market stock return (RCHN) has negative impact on dependent, Dow Jones Industrials Index stock return (RUSA), and investor sentiment in Oil&Gas industry (SEN1) have positive impacts on dependent. The explanation for variables, when A-Share market stock return (RCHN) increases 1 point, Oil&Gas industry stock return will decreases 0.745, when Dow Jones

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Industrials Index return (RUSA) increases 1 point, the Oil&Gas industry stock return will increase 0.057 and when the investor sentiment increase 1 point, the Oil&Gas industry stock return will increase 0.004.

Table 11. The Regression Results in Basic Materials Industry and Multicollinearity Test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collinearity Tolerance	Statistics VIF
(CONSTANT)	-1.957	0.460		-4.259	0.000		
RCHN	0.935	0.015	0.717	61.231	0.000	0.489	2.046
RUSA	0.021	0.017	0.010	1.206	0.228	0.972	1.029
IR	0.026	0.016	0.014	1.590	0.112	0.814	1.228
ER	0.177	0.065	0.026	2.717	0.007	0.745	1.342
OIL	0.000	0.001	0.001	0.131	0.896	0.561	1.782
GOLD	3.503	0.000	0.004	0.383	0.702	0.652	1.543
SEN2	0.016	0.001	0.269	23.042	0.000	0.491	2.035

From the Basic Materials industry test table output results summarize the regression formula:

RIND2t = -1.957 + 0.935RSHAt + 0.177Exct + 0.016Sen2t

For multicollinearity test all variables statistics VIF are all < 5, so there happened no multicollinearity problems between independents. For significance of RUSA is at 0.228 > 0.05, IR is at 0.112 > 0.05, OIL is at 0.896 > 0.05, GOLD is at 0.702 > 0.05, so RUSA, IR, OIL and GOLD there are no Sig. effects on stock return in Basic Materials industry. For RCHN, ER and SEN2 have positive impact on Basic Materials industry stock return, when RCHN increases 1 point, the stock return in Basic Materials industry will increase 0.935, when ER increases 1%, the stock return in Basic Materials industry will increase 0.177, and when SEN2 increases 1 point , the stock return in Basic Materials industry will increase 0.016.

Table 12. The Regression Results in Industrials and Multicollinearity test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collinearity Tolerance	Statistics VIF
(CONSTANT)	-0.690	0.385		-1.792	0.073		
RCHN	0.947	0.013	0.794	72.364	0.000	0.466	2.144
RUSA	-0.018	0.014	-0.009	-1.233	0.218	0.973	1.027
IR	0.036	0.014	0.022	2.628	0.009	0.814	1.229
ER	0.039	0.054	0.006	0.722	0.417	0.745	1.342
OIL	0.000	0.001	-0.007	-0.695	0.478	0.560	1.786
GOLD	-6.688	0.000	-0.008	-0.873	0.383	0.652	1.535
SEN3	0.011	0.001	0.193	17.662	0.000	0.472	2.117

From the industrials test table output results summarize the regression formula:

RIND3t = -0.690 + 0.947RSHAt + 0.036Intt + 0.011Sen3t

For multicollinearity test all Sig. values of variables of VIF < 5, so there presents no multicollinearity problems in this model. The significance value of RUSA is at 0.218 > 0.05, ER is at 0.417 > 0.05, OIL is at 0.478 > 0.05 and GOLD is at 0.383 > 0.05, so RUSA, ER, OIL and GOlD there have no significances on Industrials stock return. When RCHN increases 1 point, the Industrials stock return will increase 0.947, when IR increases 1%, the Industrials stock return will increase 0.036, and when SEN3 increases 1 point, the Industrials stock return will increase 0.011 points, RCHN, IR and SEN3 showing positive effects on Industrials stock return.

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Table 13. The Regression Results in Consumer Goods Industry and Multicollinearity Test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collinearity Tolerance	Statistics VIF
(CONSTANT)	-1.882	0.459		-4.104	0.000		
RCHN	0.695	0.015	0.638	46.371	0.000	0.505	1.980
RUSA	-0.040	0.017	-0.023	-2.351	0.019	0.973	1.027
IR	0.043	0.016	0.029	2.690	0.007	0.814	1.229
ER	0.158	0.065	0.028	2.434	0.015	0.745	1.342
OIL	0.000	0.001	-0.004	-0.282	0.778	0.561	1.783
GOLD	-2.732	0.000	0.000	-0.030	0.976	0.652	1.543
SEN4	0.018	0.001	0.333	24.363	0.000	0.512	1.952

From the consumer goods industry test table output results summarize the regression formula:

RIND4t = -1.882 + 0.695RSHAt - 0.04RDJIt-1 + 0.043Intt + 0.158Exct + 0.018Sen4t

The table shows that the VIF of all variables values are all < 5, so there have no multicollinearity problem. The significance value of OIL is at 0.778, and the GOLD's is at 0.976, so there is no significance on dependent variable. RUSA beta is at -0.040, when RUSA increases 1 point , the Consumer Goods industry stock return will decease 0.04, showing the negative effect on Consumer Goods stock return. When the RCHN increases 1 point, the stock return in Consumer Goods industry will increase 0.695, when the IR increase 1%, the stock return in Consumer Goods industry will increase 0.043, ER increases 1%, the stock return in Consumer Goods industry will increase 0.158. When SEN4 increases 1 point, the stock return will increase 0.018, showing positive effects on Consumer Goods industry stock return.

Table 14. The Regression Results in Health Care Industry and Multicollinearity Test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collinearity Tolerance	Statistics VIF
(CONSTANT)	-0.893	0.531		-1.682	0.093		
RCHN	0.487	0.016	0.438	31.388	0.000	0.633	1.580
RUSA	-0.020	0.020	-0.012	-1.031	0.302	0.972	1.028
IR	0.004	0.019	0.002	0.200	0.841	0.814	1.228
ER	-0.036	0.075	-0.006	-0.474	0.636	0.745	1.342
OIL	0.000	0.001	-0.007	-0.480	0.631	0.561	1.783
GOLD	-4.924	0.000	-0.006	-0.465	0.642	0.652	1.543
SEN5	0.028	0.001	0.532	38.555	0.000	0.646	1.555

From the Health Care industry test table output results summarize the regression formula:

RIND5t = -0.893 + 0.487RSHAt + 0.028Sen5t

For multicollinearity test all VIF of variables are <5, so there presents no multicollinearity problems. The table shows that the significance of RUSA is at 0.302, IR is at 0.841, ER is at 0.636, OIL is at 0.631 and GOLD is at 0.642, are all > 0.05, so there are no significances on dependent variable. RCHN and SEN5 present the positive influence on Health Care industry stock return, when RCHN increases 1 point, the stock return in Health Care industry will increase 0.487, and when SEN5 increases 1 point, the stock return will increase 0.028.

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Table 15. The Regression Results in Consumer Services Industry and Multicollinearity Test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collineariy Tolerance	Statistics VIF
(CONSTAN)	0.028	0.524		0.054	0.957		
RCHN	0.798	0.017	0.635	47.983	0.000	0.535	1.869
RUSA	-0.039	0.020	-0.020	-1.999	0.046	0.973	1.028
IR	0.015	0.018	0.009	0.831	0.406	0.815	1.228
ER	-0.111	0.074	-0.017	-1.492	0.136	0.745	1.342
OIL	0.000	0.001	-0.004	-0.277	0.781	0.559	1.788
GOLD	0.000	0.000	-0.018	-1.479	0.139	0.651	1.536
SEN6	0.020	0.001	0.342	26.037	0.000	0.544	1.839

From the Consumer Service industry test table output results summarize the regression formula:

RIND6t = 0.028 + 0.789RSHAt - 0.039RDJIt-1 + 0.02Sen6t

The output shows that VIF of all independent variables are < 5, so there have no multicollinearity problems in the model. The Sig. of IR is at 0.406, ER is 0.136, OIL is at 0.781 and GOLD is at 0.139, are all > 0.05, so there are no significance on stock return in Consumer Service industry. When RCHN increases 1 point, the Consumer Service stock return will increase 0.789, and when RUSA increases 1 point the stock return conversely will decrease 0.039 showing negative direction effect. When SEN6 increases 1 point, the stock return in Consumer Service industry will increase 0.02.

Table 16. The Regression Results in Utilities Industry and Multicollinearity Test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collinearity Tolerance	Statistics VIF
(CONSTANT)	-0.146	0.490		-0.299	0.765		
RCHN	0.745	0.016	0.690	46.846	0.000	0.508	1.968
RUSA	-0.012	0.018	-0.007	-0.644	0.520	0.973	1.028
IR	-0.006	0.017	-0.004	-0.361	0.718	0.811	1.233
ER	-0.070	0.069	-0.012	-1.018	0.309	0.745	1.343
OIL	0.000	0.001	-0.003	-0.187	0.852	0.561	1.784
GOLD	9.484	0.000	0.013	0.976	0.329	0.651	1.536
SEN7	0.012	0.001	0.250	17.088	0.000	0.515	1.944

From the Utilities industry test table output results summarize the regression formula:

RIND7t = -0.146+ 0.745RSHAt + 0.012Sen7t

The output in Utilities industry test shows that no multicollinearity problem in variables because all independent variables VIF < 5. The Sig. of RUSA is at 0.520, IR is at 0.718, ER is at 0.309, OIL is at 0.561 and GOLD is at 0.329, are all > 0.05, so there prove no significance on stock return in Utilities industry. When RCHN increases 1 point, the Utilities industry stock return will increase 0.745, and when SEN6 increases 1 point, the stock return in Utilities industry will increase 0.012, showing positive effects on stock return in utilities industry.

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Table 17. The Regression Results in Financials and Multicollinearity Test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collinearity Tolerance	Statistics VIF
(CONSTANT)	-0.281	0.479		-0.587	0.557		
RCHN	0.767	0.016	0.719	48.421	0.000	0.493	2.029
RUSA	-0.022	0.018	-0.013	-1.233	0.218	0.973	1.027
IR	0.019	0.017	0.013	1.120	0.263	0.814	1.229
ER	-0.042	0.068	-0.008	-0.626	0.532	0.745	1.341
OIL	-0.001	0.001	-0.018	-1.260	0.208	0.561	1.782
GOLD	0.000	0.000	0.016	1.230	0.219	0.652	1.543
SEN8	0.010	0.001	0.216	14.629	0.000	0.500	2.002

From the Financials test table output results summarize the regression formula:

RIND8t = -0.281+ 0.767RSHAt + 0.01Sen8t

For multicollinearity problem test he output presents that no multicollinearity problem in variables because all VIF of independent variables are < 5. The Sig. of RUSA is at 0.218, IR is at 0.263, ER is at 0.532, OIL is at 0.208 and GOLD is at 0.219, are all > 0.05, so there are no significances exhibited. When RCHN increases 1 point, the Financials stock return will increase 0.767, and when SEN8 increases 1 point, the stock return in Financials will increase 0.01, RCHN and SEN8 show positive effects on stock return in Financials.

Table 18. The Regression Results in Technology Industry and Multicollinearity Test

Variables	Unstandardized Beta	Coefficients Std. Error	Standardized coefficients Beta	t	Sig.	Collinearity Tolerance	Statistics VIF
(CONSTANT)	-0.452	0.694		-0.651	0.515		
RCHN	0.616	0.020	0.431	30.717	0.000	0.647	1.546
RUSA	-0.002	0.026	-0.001	-0.071	0.943	0.973	1.027
IR	0.043	0.024	0.022	1.762	0.078	0.815	1.227
ER	-0.139	0.098	-0.018	-1.415	0.157	0.745	1.342
OIL	-0.003	0.001	-0.038	-2.506	0.012	0.558	1.791
GOLD	-4.962	0.000	-0.005	-0.359	0.720	0.652	1.543
SEN9	0.035	0.001	0.535	38.420	0.000	0.656	1.525

From the Technology industry test table output results summarize the regression formula:

RIND9t = -0.452+ 0.616RSHAt - 0.003OILt + 0.035Sen9t

The output shows that no multicollinearity problem in independent variables because all VIF are < 5. The Sig. of RUSA is at 0.943, IR is at 0.078, ER is at 0.157 and GOLD is at 0.720, are all > 0.05, so there are no significance on Technology industry stock return. When RCHN increases 1 point, the Technology industry stock return will increase 0.616, and when SEN9 increases 1 point, the stock return in Technology industry will increase 0.035, showing positive effects. The OIL presents negative effects on stock return. When OIL increases 1 unit, the stock return in Technology industry will decrease 0.003, showing negative effects on technology stock return.

5. CONCLUSION AND RECOMMENDATION

Based on the empirical results from chapter 4, giving that factors affecting stock return in nine industries, this chapter will present the conclusion and propose recommendations to government, organizations , companies and investors.

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This research investigates macro economic factors (interest rate, exchange rate, crude oil price and gold price) and investor sentiment to study the influences on stock return in nine industries of ShangHai A-Share market. To detect the correlation this study applied multiple linear regression model and used normality test to diagnose normal distribution problem, heteroscedasticity test to find error term whether consistent across values of dependent variables, D-W test to detect serial correlation problem and multicollinearity test to detect if high correlation between independent variables.

From the results of Oil&Gas industry, Basic Materials industry, Industrials, Consumer Goods industry, Health Care industry, Consumer Services industry, Utilities industry, Financials and Technology industry, investor sentiment positively affects stock return. Delong, Summers (1990) first proposed investor sentiment impacts on stock market, Karolina (2014) test eight emerging countries finding positive effect between investor sentiment and stock returns. Corredor (2015) also pointed that investor sentiment is a key variable in prices of stock, Malcolm Bake (2007) and Saumya (2013) presented the evidences that investor sentiment affect stock return mostly.

Investor sentiment affects investment behavior, and then through stock price affects stock returns. Investor sentiment can be used as a predictor of stock returns. Investor sentiment will have a greater impact on the current period and will have different characteristics at different stages of the market XiangRong Han (2012). As in common, when investors are more positive for economy and stock market, the stock return will increase, investor affected by market also affect stock market performance. Also the listed companies management quality for investor sentiment is very important, for good governing companies, investors always show positive sentiment.

In the stock market investment, we must pay attention not only to the financial statements and operations of listed companies, but also to the changes in investor sentiment. For irrational information and investment, understanding the impact of investor sentiment on stocks is important to make the right investment behavior.

Pay attention to government policy adjusted for economy development such as interest rate and exchange rate, normally when interest rate increased the stock market would show weak trends. And strengthen the construction of stock market system. The government should focus on establishing a timely and information-receiving, transparent and efficient stock market. At the same time, the regulatory authorities intensified the review of listed companies to ensure that listed companies comply with relevant laws and regulations of the securities market, strengthen internal corporate governance, and enable the company to play an active role in the stock market, giving investors more confidence and a healthy stock market environment, so that the monetary policy and macroeconomic factors could more realistic reflect the changes of the stock market, ensure that investors in stock market could adjust their investing tactics or strategies and lower their capital risk.

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