Scholars Journal of Economics, Business and Management (SJEBM) **e-ISSN 2348-5302**
Abbreviated Key Title: Sch. J. Econ. Bus. Manag. **p-ISSN 2348-8875**

A Unit of Scholars Academic and Scientific Society, India
www.saspjournals.com

The Analysis of Characteristics about Yield Fluctuation Based on Guizhou Moutai Stock

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Article History
Received: 02.07.2018
Accepted: 19.07.2018
Published: 30.07.2018

DOI:
10.36347/sjebm.2018.v05i07.015

Abstract: In view of Guizhou Moutai shares rose in the past three years, A GARCH model was established by Eviews software in this paper. The yield fluctuation characteristics of Guizhou Moutai were analyzed through stationarity test. The estimating equation of yield fluctuations was got. We found that there was positive, linear and correlation relationship between trading volume and yields, and the volume decline caused by the earnings volatility smaller than the volume rise caused by the fluctuation of the same size. By the results of this article, the volume to the stock yield played a role, it will help our understanding of corporate profitability and share price volatility characteristic and trend prediction, and it also has important practical significance.
Keywords: GARCH model; Share price; the yield.

INTRODUCTION

PREFACE

The stock market volatility is an important subject in the field of modern finance, while the Chinese stock market is one of the world's most volatile markets, so it is particularly important to the study of Chinese stock market volatility. Now think about the stock market volatility research mainly has two directions: one is the research about the cause of volatility, which study the issue of why volatility; another is the research on volatility inherent law, namely the volatility characteristics of the study.

And research for volatility model mainly has two kinds, one kind is autoregressive conditional heteroscedasticity (ARCH) model (including the GARCH model), another kind is stochastic volatility (SV) model. Zhen-long Zheng [1] thought in the prediction period is relatively short, GARCH (1, 1) model contains information is more, the strongest predictive power, reflected the most comprehensive information. Single [2] pupil of the empirical research system by using the GARCH model analyzed the characteristics of the volatility in the stock price of Chinese stock market, found that the volatility of the stock market of our country has asymmetry and leveraged. Haidi [3] through research analysis when market or investor is perfectly rational, positive correlation between expected returns and volatility relations; And when the market or investors showed not completely rational, volatility is negatively related to the expected returns are often present a relationship; And when the rational investors and irrational investors in the market close, to forecast earnings volatility is weak. Dai Qingwen [4] through from the financial analysis of listed companies, proves that profitability is the core of the financial information a comprehensive evaluation of listed companies, earnings per share and net assets yield is the most significant impact on stock yield of financial indicators. Hu Hao [5] use a series of deep, analysis and comparison of the Shanghai stock market, the Shanghai stock market and Shenzhen stock markets are showing obvious volatility clustering, asymmetry and rush thick tail. Shanghai rush fat-tailed features than Shenzhen, and Shenzhen is bigger than Shanghai's volatile, risk is also higher.

GARCH model introduction

If a stationary random variable can be expressed as the return of order p process, namely $x_t \sim \mathrm{AR}(p)$, the variance of the random error term available error square of q order distribution lag model (DLM) description:

$$x_t = \beta_0 + \beta_1 x_{t-1} + \beta_2 x_{t-2} + \cdots + \beta_p x_{t-p} + \mu_t \quad (1)$$

$$\sigma_t^2 = E\left(\mu_t^2\right) = \alpha_0 + \alpha_1 {\mu_{t-1}}^2 + \alpha_2 {\mu_{t-2}}^2 + \cdots + \alpha_q {\mu_{t-q}}^2 \quad (2)$$

Say μ_t to q order process of the ARCH, remember to do $\mu_t \sim \mathrm{ARCH}(q)$, including (1) type called average equation, (2) type called ARCH equation.

Among them, in order to ensure the stability, (1) should also meet the conditions, the characteristic equation

$$1-\beta_1 L-\beta_2 L^2-\cdots-\beta_p L^p=0 \qquad (3)$$

ARCH (q) model (2) is about σ_t^2 distributed lag model. To avoid the lag of μ_t^2 too much, can be used to join σ_t^2 lagging way, namely:

$$\sigma_t^2=\alpha_0+\alpha_1\mu_{t-1}+\lambda_1\sigma_{t-1}{}^2 \qquad (4)$$

This model for the generalized autoregressive conditional heteroscedastic model, using GARCH (1, 1), where μ_{t-1} is called the ARCH, σ_{t-1} is called GARCH, (4) shall meet $\alpha_0>0, \alpha_{_1}\geq 0, \lambda_1\geq 0$.

Guizhou Moutai stock yield fluctuation characteristics analysis

Stock yields a statistical description

Guizhou Moutai increase a lot in the last three years, for growth stocks, have very high research value, this article from the "great wisdom" 365 on July 21, 2017, to find until June 19, 2018 deal closing price as the research object, a total of 222 data.

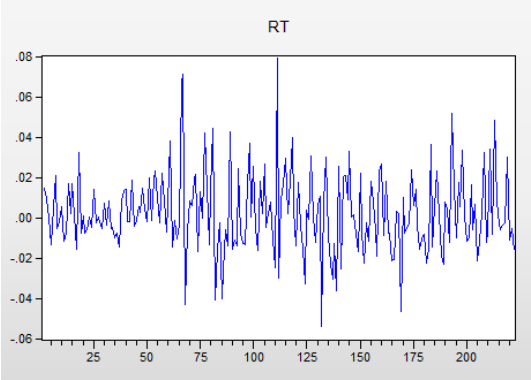


Fig-1: yield line chart

We can see from the diagram, the sequence of yield of the Guizhou Moutai has obvious aggregation, a high yield after getting higher yields, a low yield after getting lower yields.

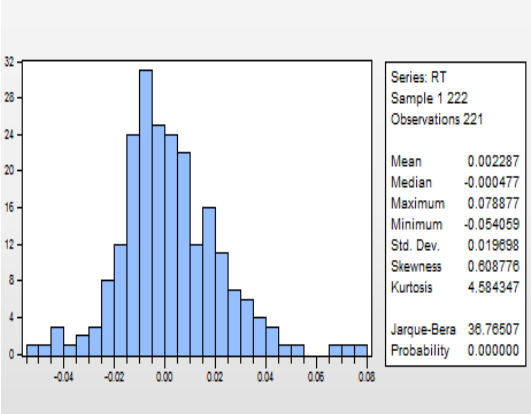
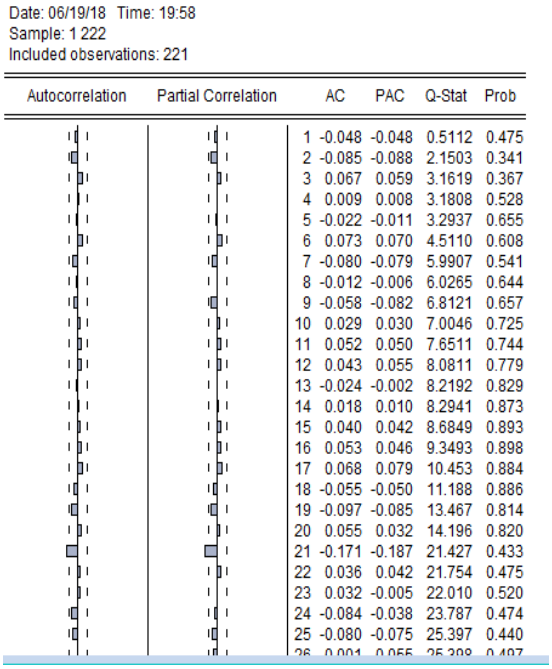


Fig-2: yields a histogram

Can get some basic statistics, Guizhou Moutai yield sequence according to the basic statistics shown in the figure, the yield sequence has obvious peak phenomenon (kurtosis = 4.584347), back to starboard (partial degree is 0.60876), at the same time, JB statistics p value is zero, Guizhou Moutai yield sequence is not normal distribution.

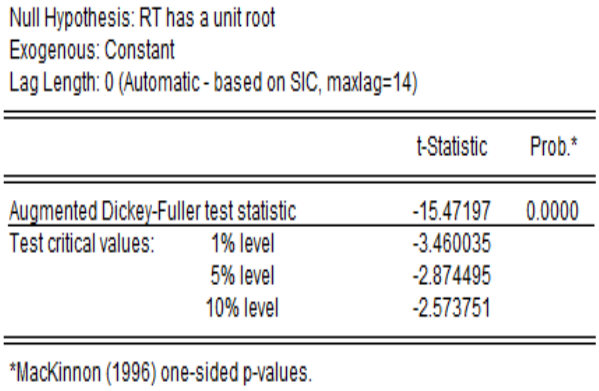


Date: 06/19/18 Time: 19:58
Sample: 1 222
Included observations: 221

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.048	-0.048	0.5112	0.475
		2	-0.085	-0.088	2.1503	0.341
		3	0.067	0.059	3.1619	0.367
		4	0.009	0.008	3.1808	0.528
		5	-0.022	-0.011	3.2937	0.655
		6	0.073	0.070	4.5110	0.608
		7	-0.080	-0.079	5.9907	0.541
		8	-0.012	-0.006	6.0265	0.644
		9	-0.058	-0.082	6.8121	0.657
		10	0.029	0.030	7.0046	0.725
		11	0.052	0.050	7.6511	0.744
		12	0.043	0.055	8.0811	0.779
		13	-0.024	-0.002	8.2192	0.829
		14	0.018	0.010	8.2941	0.873
		15	0.040	0.042	8.6849	0.893
		16	0.053	0.046	9.3493	0.898
		17	0.068	0.079	10.453	0.884
		18	-0.055	-0.050	11.188	0.886
		19	-0.097	-0.085	13.467	0.814
		20	0.055	0.032	14.196	0.820
		21	-0.171	-0.187	21.427	0.433
		22	0.036	0.042	21.754	0.475
		23	0.032	-0.005	22.010	0.520
		24	-0.084	-0.038	23.787	0.474
		25	-0.080	-0.075	25.397	0.440
		26	0.001	0.055	25.398	0.497

Fig-3: yields of autocorrelation and partial autocorrelation

Then we autocorrelation and partial autocorrelation test was carried out on the data, get the results as shown in figure-3, we can find that, the sequence of the autocorrelation coefficients (AC) is not quickly approaching with 0, but the volatility happened near the zero, thus we know, the original data sequence is smooth sequence.



Null Hypothesis: RT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=14)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-15.47197	0.0000
Test critical values:	1% level	-3.460035	
	5% level	-2.874495	
	10% level	-2.573751	

*MacKinnon (1996) one-sided p-values.

Fig-4: partial autocorrelation sequence test results

Can be seen from the results of the ADF test value is less than the significant level threshold（$t=-15.47197$, and the probability of the first kind of mistake is less than 0.0001, shows that we can't refuse to Guizhou Moutai yield sequence is stationary time series of the original assumption.

Equation to estimate

From the above we can know, on the yield of Guizhou Moutai is smooth time series. So we can use equation (5) to the fitting.

$$r_t = \mu_t + \varepsilon_t \qquad (5)$$

Dependent Variable: RT
Method: Least Squares
Date: 06/19/18 Time: 20:18
Sample (adjusted): 2 222
Included observations: 221 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002287	0.001325	1.726329	0.0857

R-squared	0.000000	Mean dependent var	0.002287
Adjusted R-squared	0.000000	S.D. dependent var	0.019698
S.E. of regression	0.019698	Akaike info criterion	-5.012132
Sum squared resid	0.085358	Schwarz criterion	-4.996755
Log likelihood	554.8405	Hannan-Quinn criter.	-5.005923
Durbin-Watson stat	2.089749		

Fig-5: regression test

Can be seen from the figure estimated results, intercept items are not significant when significance level of 0.1 ($p = 0.0857$, under the significance level of 0.1, $t_{\frac{0.1}{2}} = 2.617 > 1.726329$).Possible factors exist different variance influence as a result, so the GARCH effect inspection.

Dependent Variable: Y
Method: ML - ARCH (Marquardt) - Normal distribution
Date: 06/19/18 Time: 20:52
Sample: 1 222
Included observations: 222
Convergence achieved after 42 iterations
Presample variance: backcast (parameter = 0.7)
GARCH = C(3) + C(4)*RESID(-1)^2 + C(5)*GARCH(-1)

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-5507.510	8066.048	-0.682802	0.4947
P	73.82705	12.35668	5.974668	0.0000
Variance Equation				
C	2.65E+08	25200687	10.52858	0.0000
RESID(-1)^2	0.601993	0.144457	4.167269	0.0000
GARCH(-1)	-0.189242	0.040005	-4.730404	0.0000

R-squared	0.127914	Mean dependent var	44724.42
Adjusted R-squared	0.123950	S.D. dependent var	21738.44
S.E. of regression	20346.64	Akaike info criterion	22.49622
Sum squared resid	9.11E+10	Schwarz criterion	22.57286
Log likelihood	-2492.080	Hannan-Quinn criter.	22.52716
Durbin-Watson stat	0.861038		

Fig-6: GARCH inspection results

From the sequence of yield of the Guizhou Moutai and volume of GARCH estimation results showed that the mean equation, GARCH equation of the ARCH and GARCH coefficients are significant. There was positive correlation relationship between revenue and volume of Guizhou Moutai. And RESID (1) ^ 2 and GARCH (1) the coefficient of one is a negative, that volume decline caused by the earnings volatility than smaller volume rise caused by the fluctuation of the same size.Therefore, can come to Guizhou Moutai yields GARCH equation is:

$$\begin{cases} y_t = -5507.510 + 73.82705\, y_{t-1} + \mu_t & (6) \\ \sigma_t^2 = 265327467 + 0.6019983\, \mu_{t-1}^2 - 0.189242\, \sigma_{t-1}^2 & (7) \end{cases}$$

We can draw : $\mu_t = y_t + 5507.510 - 73.82705\, y_{t-1}$

Therefore, can come to Guizhou Moutai earnings equation estimation formula is:

$$r_t = y_t + 5507.510 - 73.82705\, y_{t-1} + \varepsilon_t \qquad (8)$$

Among them, where yield was represented by r_t, the volume was represented by y_t, μ_t is the non-serial correlation of random disturbance, the amount of random error was represented by ε_t.

CONCLUSION

Through the above empirical analysis, the sequence of yield of the Guizhou Moutai is smooth, it can be seen that there is linear relationship between yields and the volume, so you can think the volume, of the impact of income is positive correlation, and the volume decline caused by the earnings volatility than smaller volume rise caused by the fluctuation of the same size. Guizhou Moutai price yields with historical trading data there exists a linear relation, the day before the two days of trading data has a certain influence on still.By the research result of this paper, Guizhou Moutai price yield has close relation with historical trading data, so you can trade through the historical data to predict Guizhou Moutai price yield, the price of this results in Guizhou Moutai yield and trading prediction plays an important role, and the yield of other stock and trade situation forecast also to have certain reference significance.

ACKNOWLEDGEMENTS

This research is financially supported by the scientific research project of The Education Department of Hunan Province, China (17C0820), the Educational Reform Project of Hunan University of Humanities, Science and Technology, China (RKJGY1627), and the construction project about the Out of school practical teaching base (7411602). All the persons involved in the research projects are thanked for their help.

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